

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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EDITORIAL COMMENT.

Aut
"Kultur"
Kaiser,
aut
Nullus.

Surely with the deliberate destruction of the "Lusitania" with most of its crowd of passengers and crew, the final turn to the screw of her infamy has been given by Germany, in her most damnable attempt to enforce her idea of "Kultur" upon the entire peoples of the world. By the side of this murderous piece of work, the incendiary bomb "practice" visit to Southend of the Zeppelin in the early hours of Monday morning and other hellish excursions, pale into insignificance. The absolute callousness of the crime has so completely eclipsed all the German violations of civilised warfare, following, as it has, their employment of asphyxiating gases against the Allied troops in France, that at last the latent temper of the entire British nation has been roused, and we hope to some real purpose. From all quarters, at home and across the seas, comes the same chorus of horror and indignation at the savagery of these wild beasts in human form. In America and other neutral countries but one cry is heard—that of disgust at the foul depths of barbarism to which the German nation through its executive has descended. That, once again, in the latest

case of aerial raid, but one life was lost and little damage done, beyond a certain amount of property destroyed, cannot be placed to the credit of the raiders. By the number of destructive bombs dropped, placed at between 100 and 150, it is evident they were out for solid mischief. But again their estimates of the effect upon the nation have woefully gone astray. In their view it is by this means our people are to be scared into agitation for an early peace. Never, even during the past ten months' period of slaughter, has the nation, high and low, been more determined to prosecute the war until such time as the Germans shall be compelled to stand before the Throne of Civilisation, to have meted out to them such justice for their past deeds, as it may be found possible to accord to so degraded a people. That justice will not be satisfied with any but the utmost retribution, both in a personal and a material form, is a foregone conclusion. It is hardly conceivable that the Huns can realise what their fate must be, else would they pause in the path of "frightfulness" which they are so persistent in treading. Only one inference can be drawn from their heaped-up crimes—that they have no manner of doubt but that they will in the end emerge victorious. That they may be mistaken and that they will have to answer and make retribution for their iniquities can hardly enter into their calculations. And so it should be realised, more than ever, that nothing but the most sustained and national efforts with men and munitions can avert the world-peril of the domination by the Teutonic race of the civilised inhabitants of this globe. What that domination means has been vouchsafed to all whom it may concern since the Huns discarded their mask of lying diplomacy and cunning and displayed their partiality for everything criminal, almost for criminality's sake. At least in the British Empire, if they are powerless to act in America, the time has come when "Internment," complete and without fear or favour, of every person of enemy alien birth, naturalised or otherwise, should be insisted upon. It has been long since carried into effect in Germany. Both Russia and France have seen that no chances are taken in this respect. And now it but remains for us to follow suit, even if it be at this late hour. No stone should be left unturned to bring about this result. Public demonstrations insisting upon the immediate prosecution of this policy should be organised. Huge meetings in Hyde Park and similar public places throughout the kingdom should forthwith be announced, so that our Government may hear in no

uncertain voice what is required of them as a corollary to the premeditated wholesale murders which have so effectively been carried through. We are not alarmists. We have from the first held the opinion that although the raiding of London by aircraft is a possibility—nay even a probability—that the resultant, from a military aspect, will be negligible. There would naturally be individual calamities, which, however regrettable, could have no possible bearing upon the great main issue for which the world is at war. But it would be but the action of an imbecile to allow any chances of help from “inside” the camp, when there are ways and means of encompassing such chances. There may or may not be any real reason to think that, synchronising with the much-prophesied aerial attack on the Metropolis in the very near future which is promised, a number of fires are likely to break out “promiskus like” throughout London. But why take any chances? Prevention is better than cure, and by “caring for” all alien-born subjects, under official bar and bolt, at least each and every one of such subjects will require little other proof that they were not concerned in such abominable plots. Feeling runs high now, as may be gathered from the rousing episodes reported from all parts of the country. The action of the members of the Stock Exchange, the Baltic and similar establishments is a warning note which the Government cannot afford to ignore. Action, immediate and drastic, should be inaugurated, and every precaution taken to ensure that, at least during the period of the war, the mad beasts of Europe shall have no assistance from their blood sympathisers in our midst. Undoubtedly many cases will occur in which only whole-hearted sympathy would be but in keeping. But this is no time for differentiation. The few must suffer for the possible misdeeds of the majority, and perhaps they may still live to bless the day that they no longer reside in the land of their birth. For their own protection it would be but a gracious act on the part of the Government to take them into its safe keeping. An infuriated public is hardly a body to exercise discretion, and there is every reason to see ahead an outbreak of passion in protest against the inhumanities which have been perpetrated through the German nation, as will be with difficulty restrained. The writing on the wall is there. Let those

Another R.F.C. Honour.

IN a supplement to the *London Gazette* issued on Saturday it was announced that the King had been graciously pleased to approve of the appointment of the undermentioned officer to be Companion of the Distinguished Service Order, in recognition of his gallantry and devotion to duty whilst serving with the Expeditionary Force:—

Lieutenant Lanoe George Hawker, Royal Engineers and R.F.C.

For conspicuous gallantry on April 19th, 1915, when he succeeded in dropping bombs on the German airship shed at Gontrode from a height of only 200 feet, under circumstances of the greatest risk. Lieutenant Hawker displayed remarkable ingenuity in utilising an occupied German captive balloon to shield him from fire whilst manœuvring to drop the bombs.

The Roll of Honour.

THE following casualties in the Royal Flying Corps attached to the Expeditionary Force have been officially notified by the War Office:—

Under date May 3rd:

Wounded.

Lieutenant C. W. Anstey, S. Wales Borderers and R.F.C.
Second Lieutenant C. F. O. Master, Wiltshire Regt. and R.F.C.
Lieutenant N. C. Spratt, R.F.C.

in authority take heed before it is too late. When Germany can officially justify its action of sending, without warning, non-combatant men, women, and children to their doom by asserting that the “Lusitania” was an armed cruiser, and bolster up their aerial raid upon Southend and other seaside resorts with the official notification that they are fortified towns, all hope of inspiring the smallest spark of honour in their minds must go by the board. The only thing to keep steadfastly in front is that recruiting must be maintained and that every able man must be made to realise the necessity for his joining up. By that means only can we hope to come out on top at the end, knowing that in fighting to a finish, we have waged this unholy war in the interests of the civilised world—not merely as a nation fighting a nation—and have succeeded. The words of Mr. Lloyd George, last week, when speaking at the Newspaper Press Fund annual gathering, may well be taken to heart. The sooner the vital nature of the present struggle is realised, the sooner will the end be. Thus spoke the Chancellor of the Exchequer:—

“We accepted this war for a worthy object, and this war will end when that object is attained, and this must be the sentiment of every true-hearted Britisher to-day—under God I hope it will never end until that time comes.

“What is that object, that supreme object? The freedom of Europe! This desolating war has been forced upon us by an arrogant military caste who sought to enslave Europe; who thought they had perfected a machine that would tear through the vitals of Europe and leave it bleeding and crushed at their feet. The Prussian means to dominate the world. That is a mania which has possessed military castes almost in every century. Once or twice have they succeeded, and that has upset the balance of many who thought they could follow. But although they will not succeed, nevertheless to overthrow that ambition will cost Europe a ghastly price in blood and in treasure. Our share of that price we must be prepared to pay or for ever sink into a degrading vassalage, a poor end for a splendid Empire that was to lead the world in the paths of liberty.

“I wonder now whether the nation fully realises what the issue is, what the issue would be if defeat were possible.

“Russia is to be broken, France and any other nation that will stand up to this mighty Power must go; Russia, a toothless bear chained in its pit, France with no wings to soar or spurs to defend itself, Britain a harmless whale in the German ocean fit only for blubber for Germany. A pretty picture! But do not imagine that the Prussian does not mean it all. The nation has got to realise it; it has not quite done so yet.”

The following casualties in the Royal Naval Division in the Dardanelles was reported by the Admiralty:—

Under date May 3rd:

Killed in Action.

Lieutenant-Commander (temporary) James R. Boothby, R.N.V.R., Armoured Car Division.

Wounded.

Squadron-Commander Charles E. Risk (temporary Major, Royal Marines), Armoured Car Division.

Under date May 4th:

Wounded.

Lieutenant-Commander Stanley Lambert, R.N.V.R., Armoured Car Division.

Sub-Lieutenant Lord Loughborough, R.N.V.R., Armoured Car Division.

Under date May 5th:

Wounded.

Sub-Lieutenant Lionel W. Huntington, R.N.V.R., Armoured Car Division.

Under date May 9th:

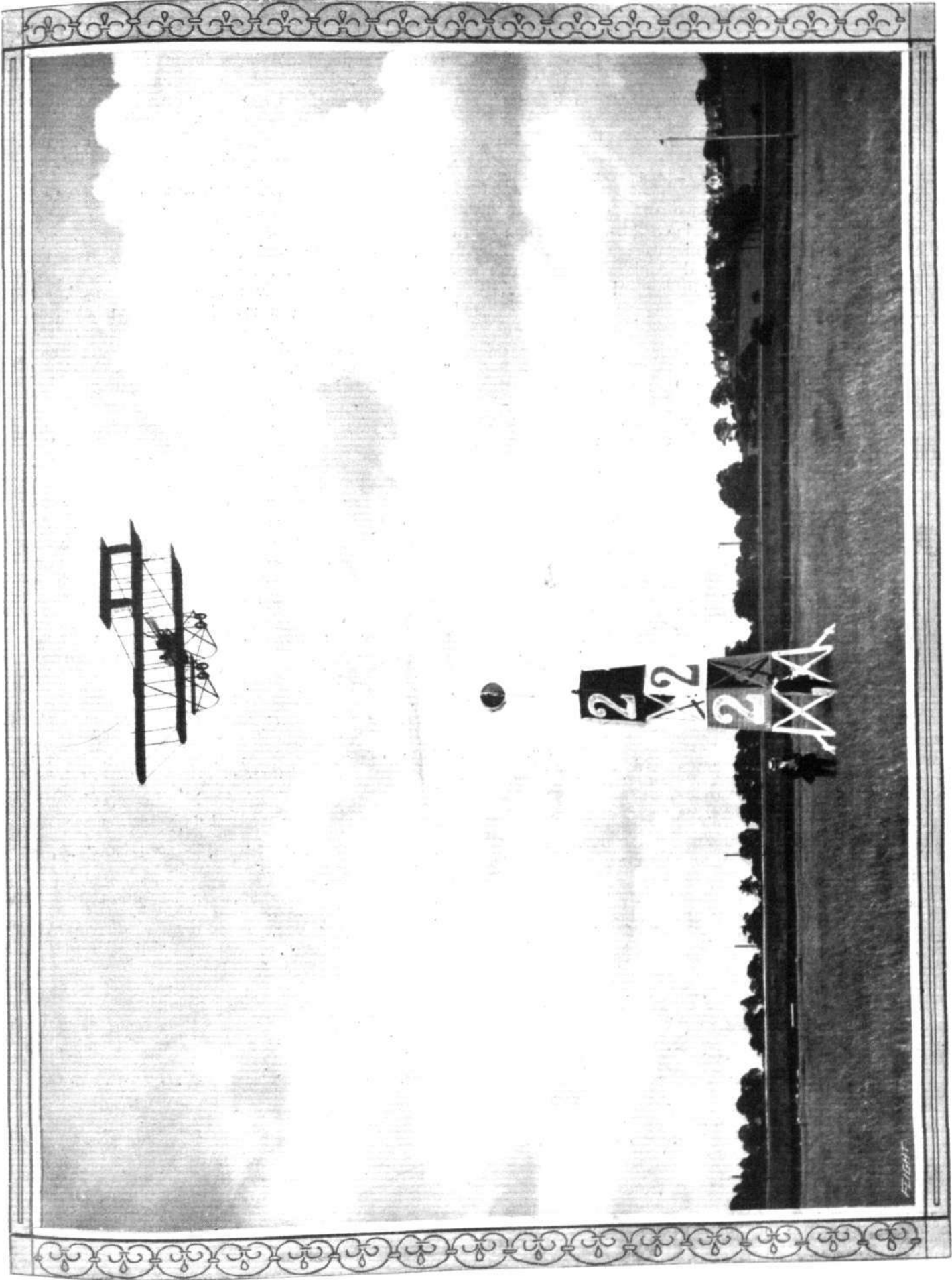
Wounded.

Sub-Lieutenant Douglas Illingworth, R.N.V.R., Armoured Car Division, R.N.A.S.

Under date May 10th:

Wounded.

Lieutenant-Commander Josiah C. Wedgwood, R.N.V.R., M.P., Armoured Car Division.



AT THE RAILWAY END OF THE HENDON AERODROME.—A last season's snap, showing Pierre Verrier rounding No. 2 pylon on a Maurice Farman.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

IN the despatch dated May 9th, from Sir John French there was the following:—

"Our airmen made successful attacks on Standre Railway Junction, north of Lille, and on the canal bridge at Don. Fournes, Herlies, Illies, Marquilles, and La Bassée were also bombed."

The following announcement was issued by the Admiralty on Saturday:—

"The statement published recently by the German authorities that a British submarine had been sunk in an encounter with a German airship is false; on the contrary, the submarine has now returned uninjured and reports that she damaged the airship by gunfire and drove her off."

The following official note was issued in Paris on the 5th inst.:—

"Our *communiqués* have on several occasions reported the success of our air squadrons in bombardment. The pilot sometimes is able to observe the result of his enterprise himself by the noise of explosions or by smoke rising from fires, but such an observation is necessarily hurried and incomplete.

"It has been possible, thanks to information received from prisoners, to acquire a better knowledge of the extent of the destruction sometimes effected. The picture thus formed confirms the importance of the bombardments carried out, and shows that our airmen display as much precision of aim in throwing bombs as courage in flying.

"On March 22nd, in the course of the bombardment of Briey railway station and of the junction of the lines to Conflans, Briey, and Metz, provision depôts were destroyed and the line was cut.

"On April 15th, in the bombardment of the St. Quentin railway station, the central ammunition depôt situated in the goods sheds and 150 trucks (most of them containing benzol) were burnt to ashes. The fire lasted from April 15th till the following day. All night long the explosions of the projectiles could be heard. Twenty-four soldiers were killed.

"On April 28th, in the bombardment of Friedrichshafen, the sheds were struck and a Zeppelin damaged. In the bombardment of the Leopoldshoehe-Lorrach district, the railway station at Haltingen, with the locomotive repair works was completely destroyed.

"Two express locomotives were badly damaged, and all the stores, including arms and ammunition belonging to the troops guarding the railway, were smashed. The railway line was smashed to atoms.

"At Lorrach forty-two Landsturm pioneers were killed or wounded, and two aeroplanes rendered useless. At Leopoldshoehe the switch-box was hit, and the train service was interrupted between Leopoldshoehe and Haltingen."

The following was contained in the official *communiqué* issued in Paris on Tuesday afternoon:—

"One of our aeroplanes bombed a hangar for dirigibles at Maubeuge, and started a fire there. An enemy aeroplane threw bombs without any result on the station at Doullens. Another, which was pursued between the Argonne and the Meuse by a French machine, was obliged to land within the German lines, where it caught fire.

"Elsewhere the Germans brought down a British aeroplane, while the British troops brought down two German machines."

THE BRITISH AIR SERVICES.

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, it is not repeated in this column.

Royal Naval Air Service.

THE following appeared in the Admiralty announcements of the 6th inst.:—

Temporary commissions as Lieutenant (R.N.V.R.) have been granted to A. S. Goodwin, P. J. H. Sumner, F. J. Toulmin, and O. H. Powell, with seniority of April 29th, and all appointed to "President," additional, for duty with R.N.A.S.

The following have been entered as Probationary Flight Sub-Lieutenants, and appointed to "President," additional, for R.N.A.S.: H. G. Henley, L. C. Keeble, and H. A. Bower, all with seniority of May 12th; and G. G. Ommaney, with seniority of May 5th.

The following appeared in the *London Gazette* of the 7th inst.:—

J. Bird to be Flight Lieutenant, April 30th.

The following appeared in the Admiralty announcements of the 7th inst.:—

F. A. Crispin granted temporary commission as Lieutenant, R.N.V.R., and appointed to the "President," additional, for Instructional Duties in the R.N.A.S., to date May 1st; and R. Griffin also granted temporary commission as Lieutenant, R.N.V.R., and appointed to the "President," additional, for duty in the R.N.A.S., to date May 4th.

J. H. Hardman and J. Simson granted temporary commissions as Sub-Lieutenants, R.N.V.R., and appointed to the "President," additional, for R.N.A.S. To date May 3rd.

The following have been entered as Probationary Flight Sub-Lieutenants, and appointed to the "President," additional, for

R.N.A.S.; to date as mentioned: H. de Verd Leigh, May 6th; L. W. Hodges, R. M. Clifford, F. R. Laver, C. Perrett, and W. L. Graham, to date May 12th; also J. D. Hume (for temporary service), to date May 12th.

The following appeared in the Admiralty announcements of the 8th inst.:—

Acting Commander F. C. Halahan, graded in R.N.A.S., as Acting Wing-Commander. To date May 6th.

Midshipman R.N.R. D. J. Sheehan transferred to R.N.A.S. as Probationary Flight Sub-Lieutenant, and appointed to the "President," additional, for R.N.A.S. To date May 7th.

J. R. Blunt and B. E. Annoot granted temporary commissions as Sub-Lieutenants, R.N.V.R., and appointed to the "President," additional, for duty with R.N.A.S. To date March 1st and April 28th respectively.

Petty Officer L. A. Hervey and Mr. C. W. A. Critchley-Salmonson entered as Probationary Flight Sub-Lieutenants for temporary service, and appointed to the "President," additional, for R.N.A.S. To date May 12th and May 5th respectively.

The following appeared in the Admiralty announcements of the 10th inst.:—

J. C. Croft entered as Probationary Flight Sub-Lieutenant, with seniority of May 12th, and appointed to "President," additional.

The following was included in the Admiralty announcements of the 11th inst.:—

Flight Lieuts. Lord Edward A. Grosvenor, R. E. C. Peirse, D. S. O., H. A. Littleton, C. D. Breese (Acting Flight Commander), E. R. C. Nanson, E. H. Sparling, R. G. Lock, A. D. Cunningham (Acting Flight Commander), J. W. O. Dalgleish, R. H. Kershaw, D. G. Young, G. R. Bromet, L. Tomkinson, J. R. W. Smyth-Pigott, and H. Delacombe (temporary), all promoted to the rank of Flight Commander, with seniority of May 7th; H. C. Fuller, T. D. Mackie (temporary), and C. M. Murphy, all granted the acting rank of Flight Commander, with seniority of May 7th.

Flight Sub-Lieuts. F. W. Strong, P. C. V. Perry, R. E. Nicoll,

D. K. Johnston, E. R. Moon, K. S. Savory, M. S. Marsden, T. H. England, D. Iron, F. G. T. Dawson, V. Nicholl, A. F. Bettington, M. E. A. Wright, J. J. Petre, B. L. Huskisson, E. H. Dunning, E. J. M. Bird, H. D. Cutler (temporary), J. O. Groves (temporary), R. P. Cannon (temporary), and R. E. Penny (temporary), all promoted to the rank of Flight Lieutenant, with seniority of May 7th. B. S. Benning, E. J. Cooper, W. K. F. G. Warneford, S. E. Ritchie, G. H. Scott, G. F. Breese, W. L. Welsh, and D. M. Barnes (temporary), all granted the acting rank of Flight Lieutenant, with seniority of May 7th.

The following appeared in the Admiralty announcements of the 12th inst. :—

C. E. Amphlett granted a temporary commission as Lieutenant, R.N.V.R., with seniority May 1st; and R. A. Dawcy (with seniority May 11th), and C. S. Fox, C. E. Walker, and F. M. Milligan as Sub-Lieutenants, R.N.V.R., with seniority May 11th and May 1st respectively, and all appointed to the "President," additional, for R.N.A.S.

Probationary Sub-Lieutenant, R. T. A. Ormsby confirmed as Sub-Lieutenant with seniority April 1st, 1915, and appointed acting Lieutenant. To date April 17th.

Temporary Sub-Lieut. A. H. Davies, appointed temporary Acting Lieutenant. To date May 4th.

Royal Flying Corps (Military Wing).

THE following appeared in the *London Gazette* of the 7th inst. :—

Flying Officers.—April 14th: Lieut. B. S. Sandeman, 2nd Highland Brig., R.F.A., T.F.; Lieut. E. F. W. Cobbold, 7th Cheshire, T.F. April 16th: Capt. D. H. Macdonell, D.S.O., Reserve of Officers; Second Lieut. M. T. Sandys, R.A., and seconded. April 22nd: Second Lieut. R. H. S. Mealing, S.R.; Second Lieut. P. G. Ross-Hume, 6th K.O.S.B., and transferred to General List, New Armies; Second Lieut. J. O. Cooper, S.R.; temporary Second Lieut. M. K. Cooper-King, 7th (Pioneers) York and Lanc., and transferred to General List, New Armies. Second Lieut. L. M. Wells Bladen, S.R., from an Assistant Equipment Officer. April 27th.

Memoranda.—Temporary Capt. Hubert Dobell relinquishes his commission on appointment to the Royal Naval Air Service. April 20th, 1915.

Supplementary to Regular Corps.—J. D. Dinneen to be Second Lieutenant (on probation). April 13th.

The following appeared in a supplement to the *London Gazette* issued on the 8th inst. :—

Flying Officers to be Flight Commanders.—Lieut. (temporary Capt.) J. E. Tennant, S. Guards. March 17th. And to be temporary Captains. April 17th: Lieut. C. E. C. Rabagliati, Yorks L.I.; Lieut. R. L. Charteris, Special Reserve; Lieut. L. G. Hawker, R.E.; Second Lieut. M. B. Blake, S.R. April 23rd: Lieut. R. E. Lewis, W. India Regt.; Lieut. C. G. Bell, S.R.

Flying Officers.—April 9th: Sec. Lieut. W. A. Grattan-Bellew, S.R.; temporary Second Lieut. E. E. Clarke, A.S.C.; Second Lieut. R. H. Mayo, S.R.

The following appeared in a supplement to the *London Gazette* issued on the 10th inst. :—

Supplementary to Regular Corps.—Second Lieutenants (on probation) confirmed in their rank: C. D. Fuller and J. C. H. Barfield.

To be Second Lieutenants (on probation): Percy D. Robinson; April 6th, 1915. Darrell B. James; April 19th, 1915. April 21st, 1915: John P. C. Sewell and Charles C. Miles. April 23rd, 1915: John L. Williams and George L. P. Henderson. William J. McConnochie; April 26th, 1915. April 27th, 1915: Lewis W. F. Turner, Reginald Hugh Carr, Frederick Dunn, E. R. Scholefield.

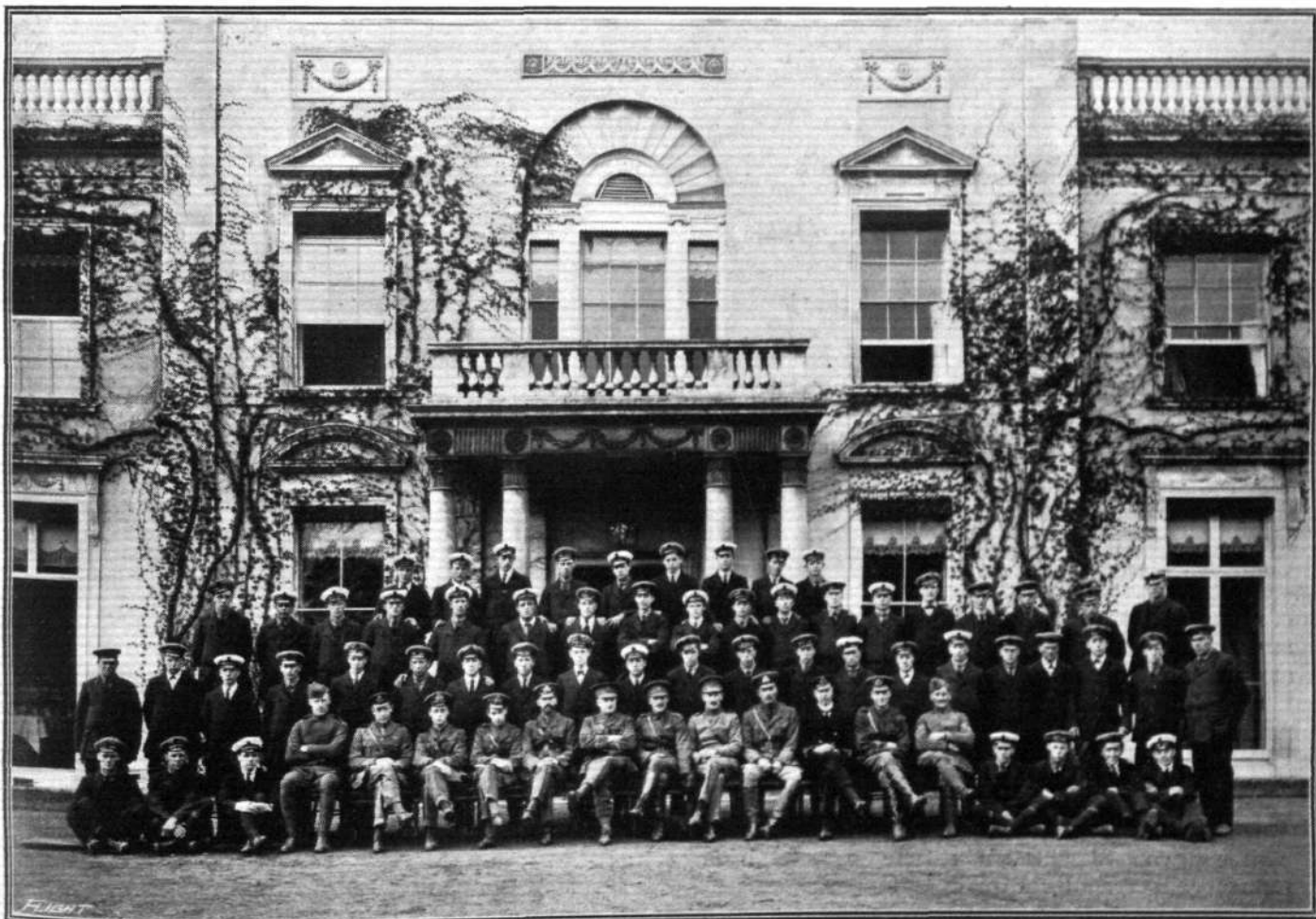
The following appeared in the *London Gazette* issued on the 11th inst. :—

Flying Officer.—Second Lieut. Robert A. Archer, R.A., and to be seconded. April 28th, 1915.

Supplementary to Regular Corps.—Second Lieutenants (on probation) confirmed in their rank: Vyvyan A. H. Robeson, Melville R. H. A. Allen, Louis W. Yule.

The following appeared in a supplement to the *London Gazette* issued on the 12th inst. :—

Flying Officer.—Second Lieut. Frederick H. Jenkins, Special Reserve; April 23rd, 1915.



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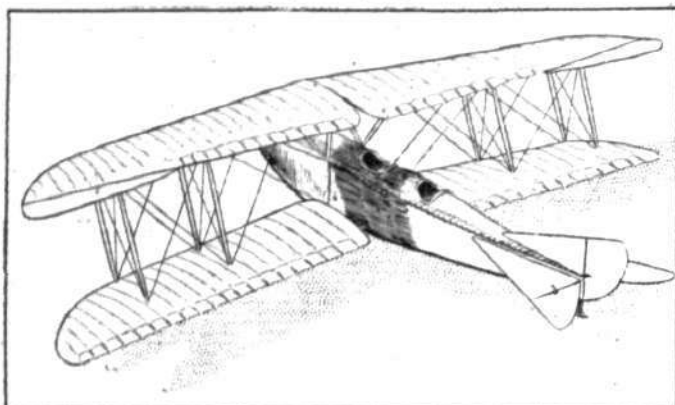
Officers and men of No. 2 Section, Kite-Balloon Service, R.N.A.S., at Rcehampton, where regular practice and training are carried out.

THE HUNGARIAN LLOYD BIPLANE.

COMPARATIVELY little had been heard of the Hungarian aeroplane industry until a short time before the outbreak of war, when, at the Aspern flying meeting, the Hungarian

surprise to many, as the large biplane gave an impression of being rather heavy, almost clumsy, in fact. This impression, however, was not justified, as the weight empty of the Lloyd biplane is about 1,500 lbs., which cannot be considered unduly heavy in proportion to the size of the machine.

Being built under licence, it is only natural that the Lloyd biplane should follow closely the lines of its German prototype the D.F.W. biplane, of which latter various types have been described from time to time in *FLIGHT*. From an inspection of the accompanying illustrations it will be seen that the Lloyd model belongs to the "Pfeil" or arrow type, having its wings set at a backward slope of 8 degrees. In plan form the lower and upper planes differ considerably, the upper plane having a nearly straight trailing edge, whilst that of the lower plane is almost parallel to the leading edge. This arrangement would seem to be open to criticism from a constructional point of view, owing to the great amount

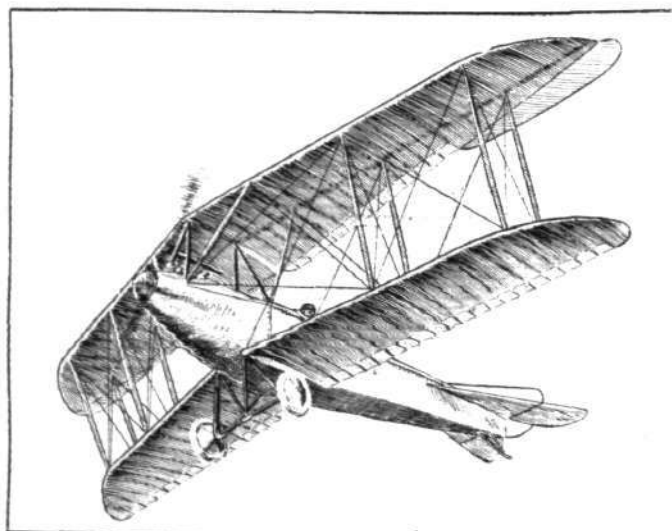


Three-quarter rear view, from above, of the Lloyd biplane.

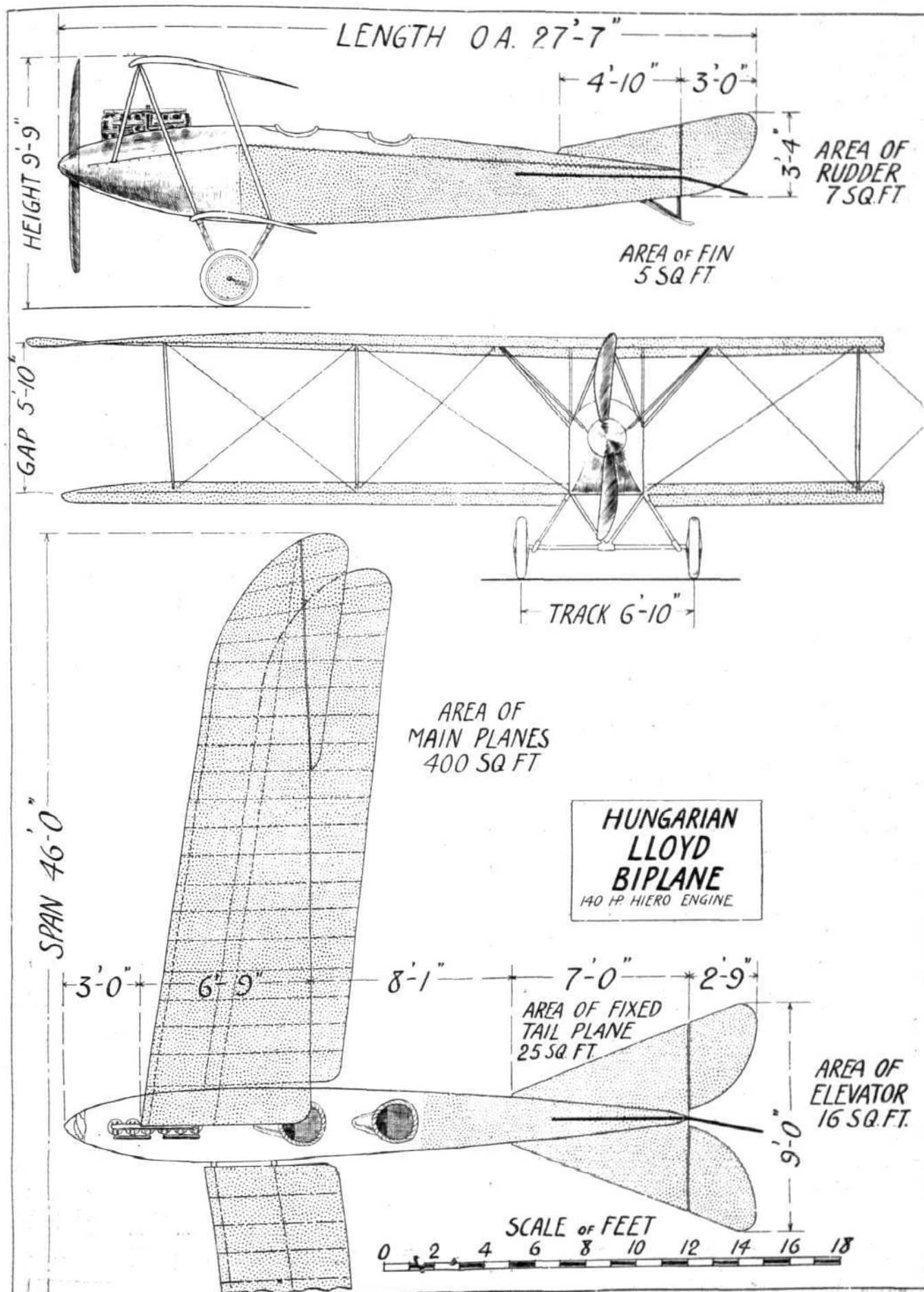


Three-quarter front view of the Lloyd biplane.

Lloyd firm leaped into prominence by the excellent performance of their new biplane. The first machine turned out by the Hungarian Lloyd Aeroplane and Motor Company, Ltd., of Aszód, Budapest, which was, by the way, built under licence from the German D.F.W. firm of Leipzig, was not finished until just before the Aspern meeting, being, in fact, put through her trial flights on the morning of June 21st, the first day of the meeting. The same evening Lieut. Bier, who will be remembered as the pilot of the Etrich monoplane in the first Circuit of Britain, and who is, or, at any rate, was, before the war, managing director of the Lloyd firm, took the machine up to an altitude of 4,120 metres with two passengers. This performance beat the record of 3,580 metres set up by Lieut. von Blaschke. On June 25th, he bettered Linnekogel's record for pilot and one passenger by reaching a height of 5,600 metres, and two days later improved his own record, pilot and one passenger, by 570 metres, and raised the record for pilot and two passengers to 4,440 metres. These performances came as a



The Lloyd biplane as seen from below.



Plan, front and side elevation to scale of the Lloyd biplane.

of overhang of the inner portion of the trailing edge of the upper plane.

In addition to their rearward slope, the wings are staggered considerably in relation to one another, the upper one being about 2 ft. 6 ins. farther forward than the lower one. The top plane, which is divided in the centre, is attached to a steel tube *cabane* resting on the upper longitudinals of the body, whilst the two halves of the lower plane are attached to the sides of the *fuselage*. Two pairs of streamline struts connect the planes on each side of the body, and a peculiarity in the strutting is to be seen in the inner inter-plane struts, which do not, as is usually done, run from upper to lower main plane, but from the spars of the top plane to the upper longitudinals of the body. Lateral control is by means of slightly upturned *ailerons* hinged to the top plane only.

The *fuselage*, which is of rectangular section, is built up entirely of seamless steel tubes, oxy-acetylene welded. In the front portion it is covered with aluminium, and a turtle back of the same metal tops the body, while the rest of the *fuselage* is enclosed in a fabric covering. The engine—a 140 h.p. Hiero—is mounted on stout ash bearers, and is almost totally enclosed in the aluminium covering, which is at this point given a very good streamline form. The seats for pilot and observer are, as

always in the arrow type of biplanes, placed comparatively far back in the *fuselage*, the pilot occupying the rear seat, where he is able to look straight down behind the trailing edge of the lower plane. The observer, on the other hand, is situated sufficiently far forward to look over the leading edge of the lower plane, although not far enough forward to be able to drop bombs over the edge of the plane. For bomb-dropping a special apparatus is fitted inside the *fuselage*. As in the D.F.W., the seating arrangement of the Lloyd biplane is most comfortable, and very complete instrument sets are fitted. The controls are of the usual type demanded by the German and Austro-Hungarian Governments, and consist of a rotatable hand wheel for warp and elevator and a foot bar for the rudder.

The under-carriage is of the simple "W" type, and is made of streamline steel tubes. The two halves of the divided axle are hinged to the apex of the inner chassis struts, and are sprung by rubber bands from the outer members of the chassis. Disc wheels are fitted in order to reduce head resistance. The tail planes consist of a triangular fixed plane, to which is hinged the divided elevator, and of a small vertical fin, to which is hinged the rudder. The speed range is from 35 to 80 m.p.h., and the machine has climbed the first 2,000 metres in 10 minutes.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Aviators' Certificates.

THE following Aviators' Certificates have been granted:—

- 1205 Alan Carnegie Horsbrugh (Maurice Farman Biplane, Military School, Brooklands). April 30th, 1915.
- 1206 2nd Lieut. Nigel James Bengough (Fife and Forfar Yeomanry) (Maurice Farman Biplane, Military School, Brooklands). April 30th, 1915.
- 1207 Capt. James Dalton Dinneen (New Zealand Territorials) (Maurice Farman Biplane, Military School, Brooklands). April 30th, 1915.
- 1208 James Percy Carré Cooper (Beatty-Wright Biplane, Beatty School, Hendon). April 30th, 1915.
- 1209 Valentine Mason Grantham (Maurice Farman Biplane, Military School, Brooklands). May 1st, 1915.
- 1210 John Radleigh Gore-Browne (Maurice Farman Biplane, Military School, Brooklands). May 1st, 1915.
- 1211 2nd Lieut. Horace Scott Shield (Durham Light Infantry) (Maurice Farman Biplane, Military School, Farnborough). May 2nd, 1915.
- 1212 Flight Sub-Lieut. John Turner Bone, R.N.A.S. (Grahame-White Biplane, Grahame-White School, Hendon). May 5th, 1915.
- 1213 Walter Dorling Smiles (L. and P. Biplane, London and Provincial School, Hendon). May 5th, 1915.
- 1214 Flight Sub-Lieut. Harold Spencer Kerby, R.N.A.S. (Grahame-White Biplane, Grahame-White School, Hendon). May 5th, 1915.
- 1215 Yin Khean Leong (Chinese Subject) (Beatty-Wright Biplane, Beatty School, Hendon). May 5th, 1915.
- 1216 John Arthur Watson Bourne (Maurice Farman Biplane, Military School, Brooklands). May 6th, 1915.
- 1217 Lieut. John Beverley Robinson (Governor General's Body Guard, Canada) (Maurice Farman Biplane, Military School, Brooklands). May 6th, 1915.

THE FLYING SERVICES FUND.

Administered by The Royal Aero Club.

THE Lords Commissioners of the Admiralty and the Army Council having signified their approval, the Royal Aero Club has instituted and will administer a fund

originated by M. André Michelin for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependents of those who are killed.

The fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

In view of the great utility of the work of the Flying Services, evidence of which has been repeatedly given in the official despatches of the Commander-in-Chief, the skilful and daring flights into enemy country, and the protection afforded by the continuous patrolling of our coast by aircraft, it is confidently expected that the British public will welcome this opportunity of showing their appreciation by subscribing promptly and liberally to the fund.

The Right Hon. Lord Kinnaird has kindly consented to act as Honorary Treasurer to the Fund.

Subscriptions should be forwarded to The Flying Services Fund, The Royal Aero Club, 166, Piccadilly, London, W., or to Barclay and Co., Ltd., 1, Pall Mall East, London, S.W. Cheques should be crossed "Barclay and Co., Ltd."

TULLIBARDINE, Brig.-General,
Chairman of the Royal Aero Club.

	£	s.	d.
Total subscriptions received to May 5th, 1915	8,771	0	1
British Women's Patriotic League ...	100	0	0
Employés of the Blackburn Aeroplane and Motor Co., Ltd. (2nd contribution) ...	0	14	0

Total, May 12th, 1915 ... 8,871 14 1
166, Piccadilly, W. B. STEVENSON, Assistant Secretary.

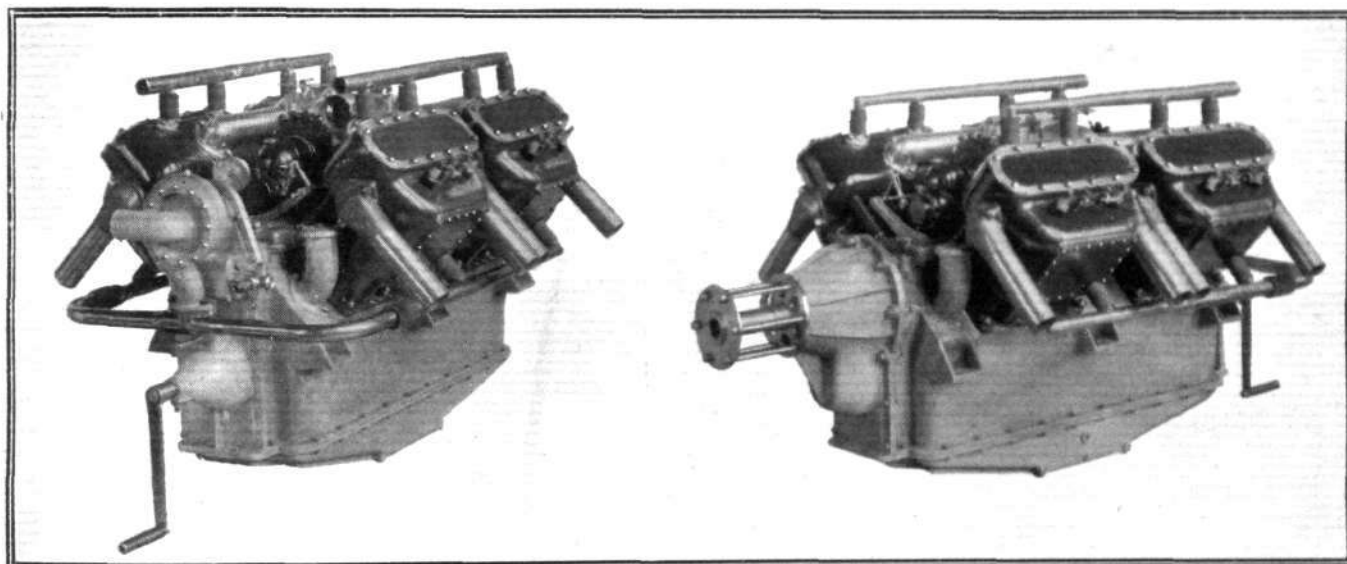
THE 140 H.P. STURTEVANT AEROPLANE ENGINE.

THERE are many indications that the American engine manufacturer is keenly alive to the importance of the motor as a factor in aeronautical development and progress, and, in consequence, has made strenuous efforts during the past few years to perfect his designs.

One of the latest models to be introduced is the one illustrated, made by the firm of Sturtevant Manufacturing Co., of Hyde Park, Boston, Mass., who already have had an extensive experience in aeroplane engine work. It develops 140 h.p. at a normal speed of 2,000 r.p.m., and is of the eight-cylinder vee type, with a bore and stroke of 4 ins. and $5\frac{1}{2}$ ins. respectively. Special care has been taken to ensure the interchangeability of every part, and it is claimed that the workmanship and materials employed in the manufacture are of the highest quality. In many respects the engine follows what may be termed ordinary car practice. The cylinders are cast in pairs of semi-steel and have L-shaped heads, all the valves being thus on the inside of the vee between the two sets of cylinders, and are operated from a single hollow camshaft

tight casing is formed in the crankcase in which are located the gears for driving the auxiliaries, speedometer and camshafts, which thus run in a bath of oil, while a second casing is cast integral with the crank chamber on the opposite end to the timing gears for the reception of the reducing gear to the propeller. This reducing gear is supplied in several gear ratios so as to enable the speed of revolution of the final drive to range from 1,000 to 1,500 revs. per min. as may be desired, while the propeller shaft is carried on two large annular ball-bearings and is fitted with a double thrust bearing to take the pull or thrust of the airscrew, according as the engine is fitted on a tractor or a propeller type of machine.

Lubrication and cooling is under pressure from pumps of the gear and the centrifugal types respectively. Oil supply of about two gallons is carried in the base of the crank-chamber and is replenished from an external tank, as fast as is necessary, by a small eccentric pump on the crank-shaft. The oil is carried through passages cast integral with crank-case and through the hollow crank



THE 140 H.P. STURTEVANT AERONAUTICAL ENGINE.—On the left is a three-quarter view of the engine from the starting end, showing the arrangement of the water pump and magnetos; while on the right is another view from the propeller end of the motor.

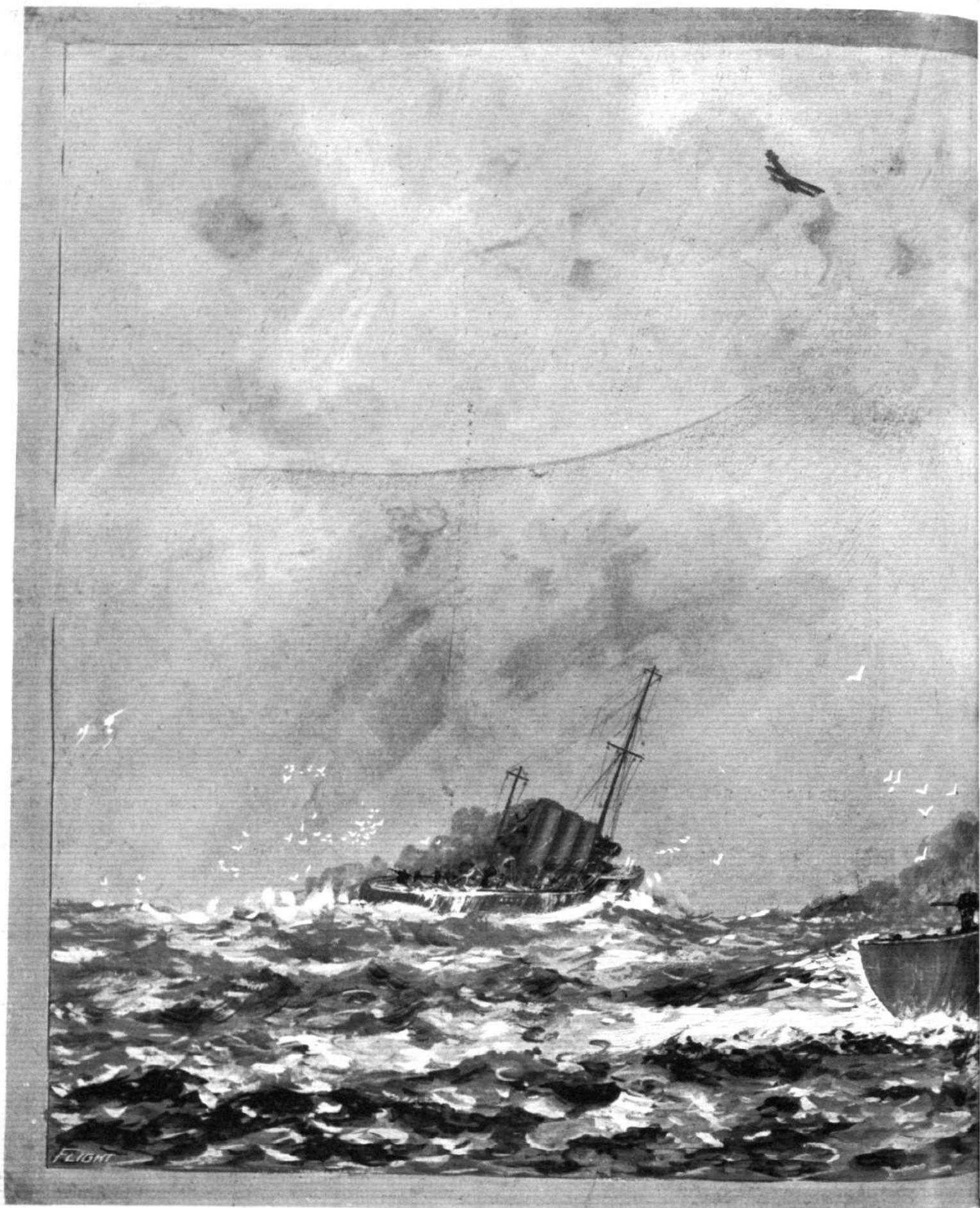
carried in six bearings placed in the upper portion of the top half of the crankcase. As an immediate result of this arrangement, the valves may be removed for inspection and grinding in without disturbing any other part of the motor. The pistons are of the same material as the cylinders, are ribbed in the head to facilitate cooling, and are provided with three compression rings.

Both the connecting rods and the crankshaft are of heat-treated nickel chrome steel, the latter being made from the solid billet, while the former are identical in shape throughout the engine. The connecting rods of opposite cylinders rest side by side in the crankpin, and are lined with white metal, but the three main bearings have detachable linings of Parsons' white brass.

The crankcase consists of two castings of aluminium alloy, the upper portion being designed with a view to obtaining great strength and rigidity rather than extreme lightness; and with this object has been carried down much below the centre line of the crankshaft, as is seen in the photographs. The lower half is, therefore, made extremely light, but has a ribbed bottom to facilitate cooling of the oil and to afford extra stiffness. An oil-

and cam-shafts to their respective bearings, while on its return to base it is filtered through a gauze covering the whole of the lower portion of the crank-case. Two Bosch or Mea magnetos and a Zenith carburettor of the double horizontal type with a single float but two jet chambers and hot air supply are fitted. These are located within the vee. A starting crank is also provided, and efficient silencers to each set of cylinders will be supplied if required. The weight of the complete unit, with carburettor, magnetos, starting gear, propeller hub, bolts and front plate, is 550 lbs.

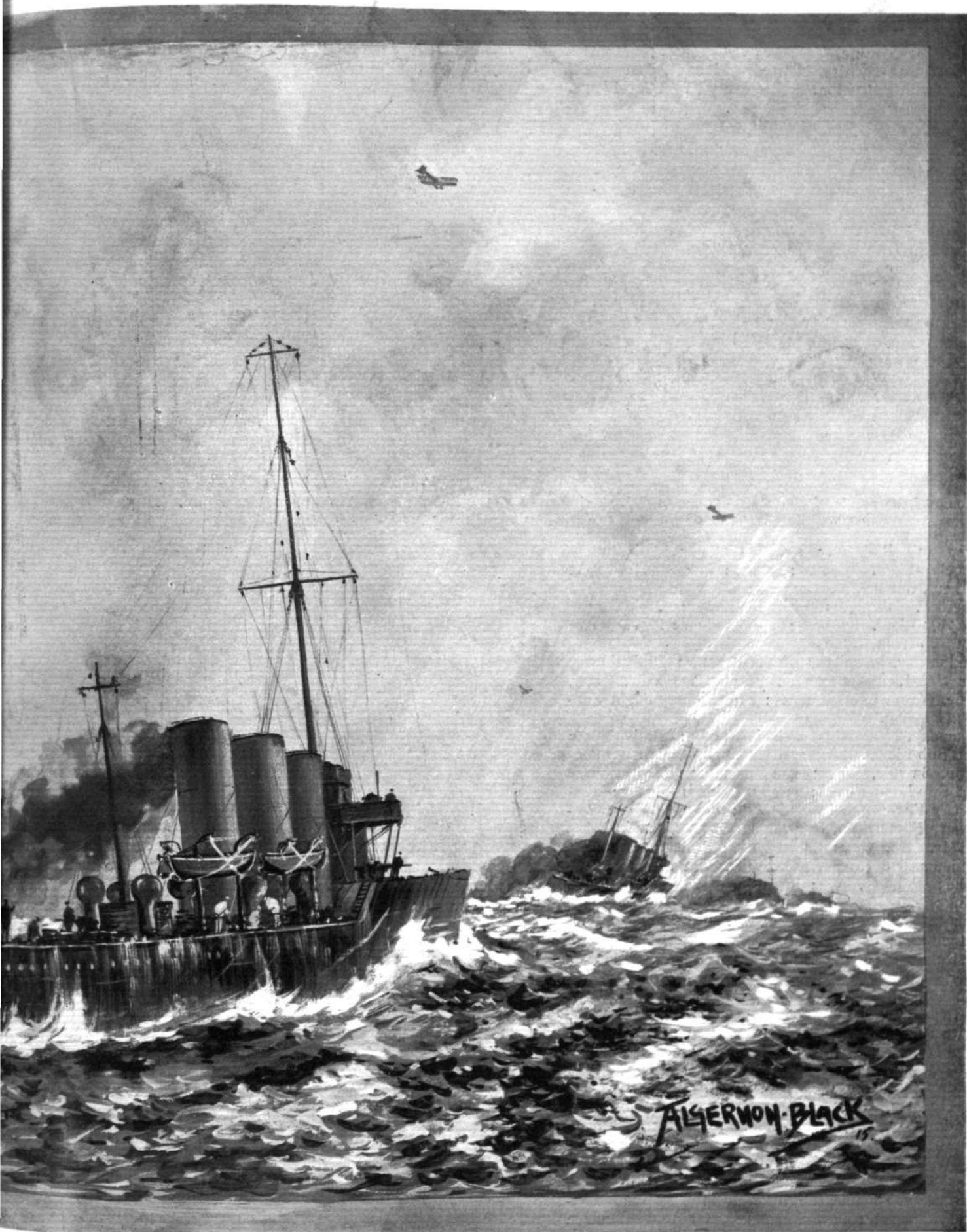
Tests carried out at the works recently, with the engine coupled to a water dynamometer, show that the motor is remarkably economical in fuel and oil, the consumption per h.p./hour when developing 141.8 h.p. at an air screw speed of 1,210 revs. per min. over a period of four hours being 0.511 lbs. and 0.045 lbs. respectively, corresponding to a fuel and oil consumption of about 73 lbs. per hour; while on a test for controllability it was shown that the torque curve is well maintained over the entire range from 600 to 1,300 revs. per min., the horse-power at these speeds ranging between 75 and 148.



SCOUTING IN THE NORTH SEA.—British destroyers and seaplanes operating off scouts operating from a hostile fleet, and so prevent them from

MAY 14, 1915.

FLIGHT



together in a scouting movement. From an original drawing by Algernon H. Black.
company with an escort of destroyers, to retrieve them if they come down owing to engine trouble, can boom
ning exact information of the whereabouts of the defensive fleet."

FROM THE BRITISH FLYING GROUNDS.

London Aerodrome, Collindale Avenue, Hendon.
Grahame-White School.—Monday, last week.
 Straights with instructor: Probationary Flight Sub-Lieuts.

Exhibition flights were given by Messrs. Beatty and Roche-Kelly on Thursday and Sunday.
Hall School.—During last week a lot of good work



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Some of the pupils of the Ruffy-Baumann School of Flying and three of the machines at present in use. This number will shortly be increased as the Works are busy on the production of several biplanes.

Burling and Bingham; straights alone: Probationary Flight Sub-Lieut. Coleman; rolling: Probationary Flight Sub-Lieut. Smyllie.

Tuesday. Straights with instructor: Probationary Flight Sub-Lieut. Bingham; circuits alone: Probationary Flight Sub-Lieut. Bone.

Wednesday. Straights with instructor: Probationary Flight Sub-Lieuts. Bingham, Burling, De Ville, Greer, Smyllie, Wain; circuits alone: Probationary Flight Sub-Lieut. Coleman.

Thursday. Straights with instructor: Probationary Flight Sub-Lieuts. Burling, Bingham, De Roeper, Pennington, Smyllie, Wain; straights alone: Probationary Flight Sub-Lieut. Greer; circuits with instructor: Probationary Flight Sub-Lieut. Hood; circuits alone: Probationary Flight Sub-Lieut. Coleman.

Friday. Straights with instructor: Probationary Flight Sub-Lieuts. De Roeper, De Ville, Wain, Pennington, Smyllie; straights alone: Probationary Flight Sub-Lieut. Burling; half-circuits: Probationary Flight Sub-Lieuts. Burling and Greer; circuits alone: Probationary Flight Sub-Lieut. Coleman.

Instructors during week: Messrs. Manton, Russell and Winter. *Brevets* taken May 5th: Probationary Flight Sub-Lieuts. Bone and Kerby, both good tickets.

Beatty School.—The following pupils were out during the week accompanied by the instructors: Messrs. Allcock (42 mins.), Bond (7), Bright (10), Broughton (10), Chalmers (49), Chapelle (35), Crossman (5), Crowe (33), de Meza (18), FitzHerbert (7), Fraser (35), Hay (58), Hodgson (16), Johnston (5), Leong (15), March (20), Morgan (20), Robb (5), Roche (85), Rutherford (5), Smith (5), Summers (40), Tomlinson (41), Wainwright (10), Whincup (5), Wiles (5). The instructors were Messrs. G. W. Beatty, W. Roche-Kelly, C. B. Prodger, and Bransby Williams, the machines in use being Beatty-Wright dual-control and single-seater and Caudron tractors.

Mr. Y. K. Leong took a very satisfactory ticket on Wednesday.



Mr. R. W. Kenworthy, who recently passed his certificate tests, on a 60 h.p. Caudron biplane, at the Ruffy-Baumann School of Flying at Hendon.

was got through, in spite of the bad weather experienced during the first part of the week.

Wednesday, Messrs. Mitchell (16 mins.) on No. 1 machine, Hatchman (15), Snowdon (10), Cook (30), Minot (15), all doing good straights on No. 3 machine, and Mr. Hill (22) on No. 1 making a number of very good straights. Lieut. Jowett (20), Messrs. Millbourne (15), Hamer (25), Booker (20). Then Lieut. Blythe up for about 20 mins. on No. 1, flying half circuits.

Thursday, Lieut. Blythe (10 mins.), Messrs. Hill (8), Mason (12), Cini (12), Minot (10), Snowdon (9), Hamer (12), Hatchman (15), and Furlong (14), all putting in some very good work during the morning.

Thursday afternoon, Lieut. Jowett (10 mins.), Messrs. Millbourne (18), Hill (8) doing straight flights, Cook (8), Minot (5), Mason (6), Hamer (7), Hatchman (12), Furlong (5), Mitchell (4), Snowdon (4), and Cini (5).

Friday, Lieut. Blythe (10 mins.), good straight flights, Messrs. Bayley (15), Furlong (6), Hill 4 straight flights, Mason (10), Millbourne (20), Cook 4 straight flights, and Mitchell 4 good flights.

Instructors for the week, Mr. J. L. Hall and H. F. Stevens. Machines in use, Nos. 1, 2 and 3 Hall tractor biplanes.

London and Provincial Aviation Co.—Tuesday last week, Mr. McCauley straights. Messrs. Hubbard and Turner rolling.

Wednesday, Mr. W. D. Smiles circuits and eights; then took good "ticket."

Thursday, Messrs. Deschamps and Allen straights. Messrs. Irwing and Hubbard rolling.

Friday, Messrs. Deschamps straights and half circuits. Messrs. McCauley and Allen straights. Messrs. Irwing and Hubbard rolling.

Saturday, Mr. Deschamps circuits and eights. Messrs.

Hubbard, McCauley, and Allen straights. Messrs. Turner and Irwing rolling.

Passenger flights given to Mr. Irwing, Allen, Turner, and Deschamps during the week.

Ruffy-Baumann School.—Much good work was done last week by all the pupils, and M. Edouard Baumann was busy on the 60 h.p. Caudron biplane carrying passengers.

Wednesday, following pupils on 45 Caudron:—Roobaert (22 mins.), Jackson (27), Cole (14), England (12), Blandy (12), King (6). R. W. Kenworthy took certificate at good altitude and with nice landings and *vol plané*.

Thursday, Roobaert doing fine circuits and eights; now ready for ticket. Cole and Jackson also nearly ready for ticket. On this day all pupils received much practice.

Friday, Roobaert (20 mins.), Jackson (20), Cole (15), England (12), Blandy (10), King (10), &c.

Monday, this week, M. Baumann was out on 60 h.p. Gnome Caudron with passengers and two new pupils. C. H. May and C. W. May joined the school.

Instructors: Baumann, James, Virgilio and Winchester.

Northern Aircraft Co., Ltd.

The Seaplane School, Windermere.—Flying was possible on Monday, Tuesday, Wednesday and Friday last week. Instructors: W. R. Ding, C. L. Pashley, and J. Lankester Parker. With instructors: C. A. Barber (7 mins.), A. Johnson (14), F. H. M. Macintyre (36), H. P. Reid (9), H. Robinson (38), J. F. Ridgway (21), G. L. Railton (23), S. J. Sibley (15). Figures of eights alone: A. Buck (70). Machines in use: Avro, 50 Gnome, dual control, and N.A.C. monoplane, 80 Gnome.

W. R. Ding, C. L. Pashley and J. L. Parker out testing.

FLYING AT HENDON.

IDEAL conditions prevailed on Thursday afternoon of last week, there being very little wind, and as a consequence the visiting crowd witnessed plenty of flying of a varied kind. The first pilots to ascend were J. H. Moore on his 45 h.p. (Anzani) L. and P. tractor biplane, and J. S. B. Winter on a 50 h.p. G.-W. school 'bus. The former pilot, who is now an instructor at the L. and P. school, climbed to 1,000 ft. in a remarkably short space of time. In the meanwhile a new Morane-Saulnier monoplane was having its engine tested prior to the machine being taken over by Lieut. B. C. Hucks, who, by the way, was looking extremely fit. Marcus D. Manton then took the stick of his old favourite, the 50 h.p. G.-W. bi-rudder 'bus, and executed many fancy stunts, much to the interest of his former looping partner. After this F. P. Raynham made a flight on a B.E.2c, we believe his first essay on this type of biplane. Later on he put it through its tests, which it passed very successfully, much to the credit of its constructors—Hewlett and Blondeau. Winter then took up the first of the afternoon passengers on the G.-W. 'bus, whilst W. Roche-Kelly gave an exhibition of steep banking on the 50 h.p. Gnome-Beatty biplane, and M. Osipenko ascended on one of the 50 h.p. G.-W. school 'buses. The writer received an invitation to a practical demonstration of the flying qualities of the 45 h.p. L. and P. biplane, which was gladly accepted. With Moore in the pilot's seat we got off after a very short run, and were some

300 or 400 ft. high after half a circuit. At this rate it was not long before we were up to 1,500 ft., the speed indicator averaging about 55 miles per hour all the time, not at all a bad performance for a 45 h.p. biplane with two up. It might be added that the machine flew very steadily, and took the "bumps" over the railway, and they were particularly nasty about that time, exceptionally well. By this time the afternoon had advanced, and the various schools started work, only leaving off just before the arrival of dusk, and a heavy thunderstorm.

Owing to a gusty wind, last Saturday afternoon was practically an off day, which was a pity, as it was otherwise fine, and there was a very good attendance. Early in the afternoon two Aircraft Co.'s Maurice Farmans—a Short-horn and a Long-horn—left the aerodrome for "somewhere," but after this there was no flying until a little after five o'clock, when M. Osipenko attempted a flight on the 50 h.p. G.-W. school 'bus, but was forced to descend after having made a straight. Shortly after, however, George W. Beatty ascended on the 60 h.p. Beatty-Wright, and in spite of the wind put up a fine exhibition of banking. During the afternoon we noticed Mr. Handley Page in the rôle of hospital nurse conducting some wounded soldiers round the aerodrome in his car.

On Sunday the wind was stronger than ever, and although M. Osipenko made a plucky attempt, flying was out of the question.

EDDIES.

ALTHOUGH the mere skeleton of information gets to the notice of the general public regarding aviatic doings in the Midlands, it must not be thought that matters aeronautical are marking-time up there. On the contrary, the greatest activity is evident in the constructional branches of the industry, and the scarcity of news will be readily appreciated when it is remembered that the bulk of the work carried out is in the nature of Government contracts. It is an open secret that among the large firms, formerly more closely associated with the manufacture of motor cars, who have turned their attention to the production of aviation material, are such familiar names as Wolseley, Austin, and Sunbeam. And this leads naturally to other developments in the same district. At Castle Bromwich the authorities have taken over a ground where hangars have been erected, and where, in the future, in all probability the output of the Wolseley and Austin firms will be tested. From a correspondent I also hear that a new racing monoplane—the D. and W.—is at present undergoing its preliminary trials at Billesley under the pilotage of Mr. Summerfield, of Melton Mowbray. In spite of the difficulties encountered due to the uneven nature of the ground—which is full of ridges—the new 'bus is said to promise exceedingly well, having, my correspondent states, been tested up to 80 miles per hour. Further news of this diminutive monoplane will be awaited with interest.

x x x

Looks as if "the Ubiquitous" would now be more appropriate than "the Glider" as attached to the name of Raynham, for that versatile pilot truly seems to be everywhere. No sooner have we heard of him delivering an Avro than he is testing a Martinsyde scout at Brook-

lands, and when one expects him to be on his way back to fetch another Avro, he suddenly pops up, as he did on Thursday of last week, at Hendon, where he put a B.E.2c through its paces. The type of machine seems to matter little to Raynham, who is equally at home on all, providing they are well built. The B.E.2c which he was flying on Thursday was constructed at the Hewlett and Blondeau works at Luton, a sufficient guarantee of super-excellence of work. Among the many spectators, and naturally not the least interested, was Mrs. Hewlett, who watched quietly, without a tinge of anxiety as to the result, the performances of this latest product of her factory. There exist, I believe, simpler and easier things to make in the metal- and wood-working line than a B.E.2c, with its many intricate fittings, so that the clean tests put yet another plume in the cap of the H. and B. firm, and this after allowing for the fact that Raynham the Ubiquitous was at the helm.

x x x

Probably there is a goodly portion of truth in the saying "Anybody can learn to fly." In the early days, before this axiom was established, the man who did fly was regarded as having been equipped by Providence with special mental and physical properties which it is not given to the many to possess. As the lists of Aero Club certificates lengthened, the halo with which these pioneers were surrounded the world over grew more and more faint, until to-day the above saying is generally accepted. Until the absolute fool-proof aeroplane has been evolved, there will always be pilots and pilots. Any school instructor knows this to his sorrow. An excellent example of the man with a natural aptitude for flying is furnished by Mr. H. F. Stevens, who joined the Hall school on April 14th. He had one flight on the 35 h.p. biplane, and two practice flights on the 45 h.p., after which he obtained his *brevet* on April 30th. True, this may not be in itself so very remarkable, but bide a wee. At the time of getting his ticket, the wind is stated to have been chasing the pen on the anemometer backwards and forwards between the 20 and 30 m.p.h. lines. Small wonder that the Hall school has now gathered in Mr. Stevens as an instructor.

x x x

The shower of Iron Crosses upon Count Zeppelin, in honour of his murderous raids on undefended places, having ceased, temporarily at any rate, the poets seem to be starting their turn. The *Cambridge Review* says:—"The following extract from a hymnal for the use of Kulturkämpfer is put at our disposal by a veracious friend, who read it the other day in a copy imported by way of Switzerland:—

"Der Du über Cherubinen,
Seraphinen, Zeppelin,
In dem höchsten Himmel thronst. . . ."

I wonder how the co-opting of Zeppelin will be viewed by the celestial hierarchy!

x x x

A note from a friend at the front tells me that Louis Noel, by his outstanding aerial reconnaissance work, has won further recognition in the shape of promotion. He is now Adjutant, a rank corresponding to Sergeant-Major in the British Army. He is now flying a Maurice Farman, a machine on which he is as much at home as on the Blériot monoplane, which helped him to gather his earlier laurels.

"ÆOLUS."



Mr. H. F. Stevens, who has just been appointed instructor to the Hall Flying School,

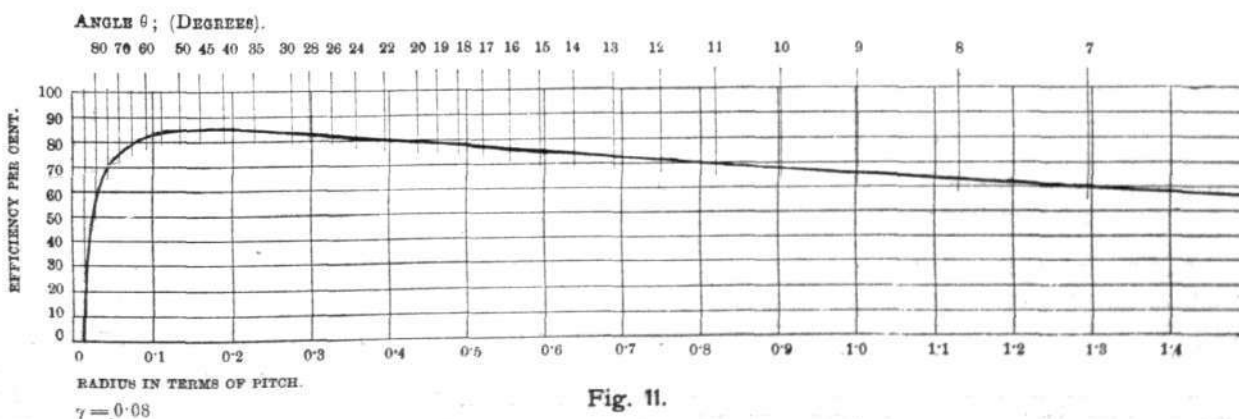
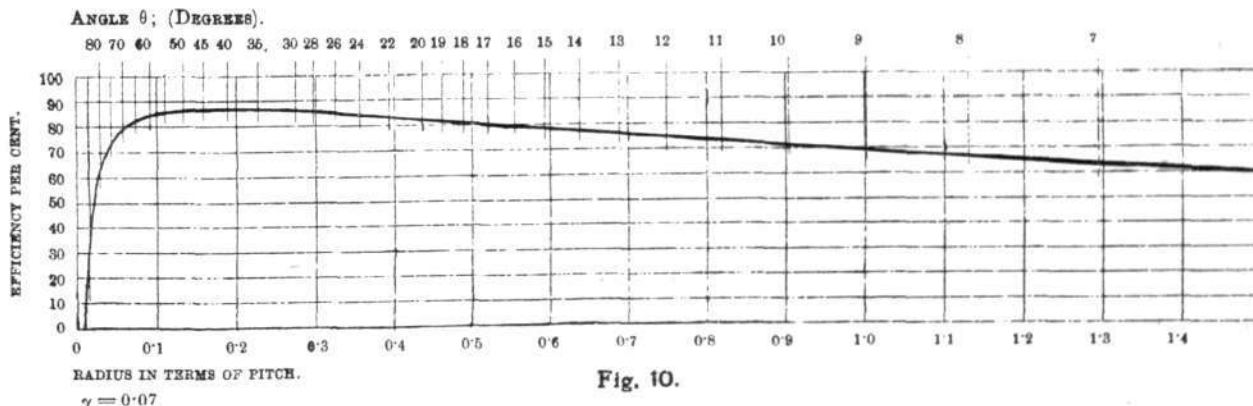
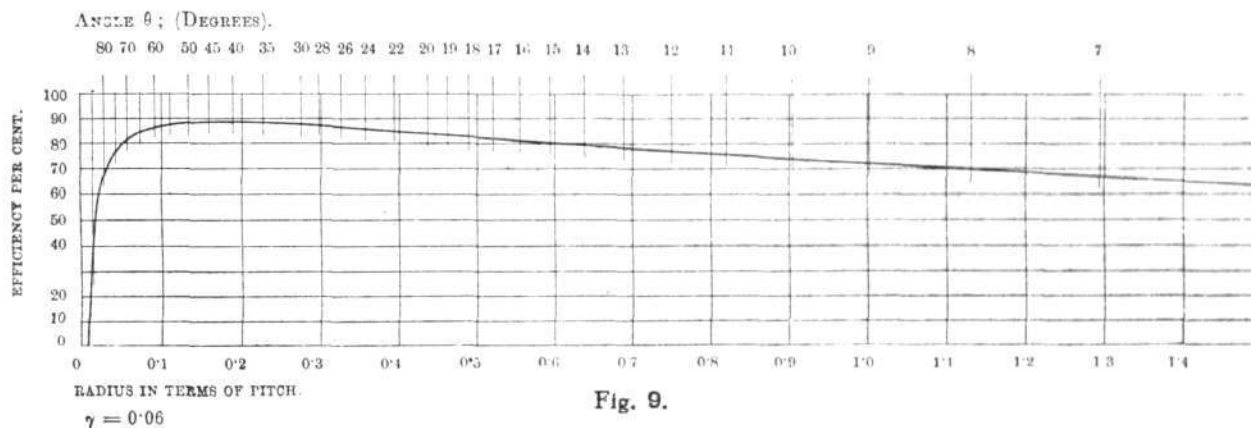
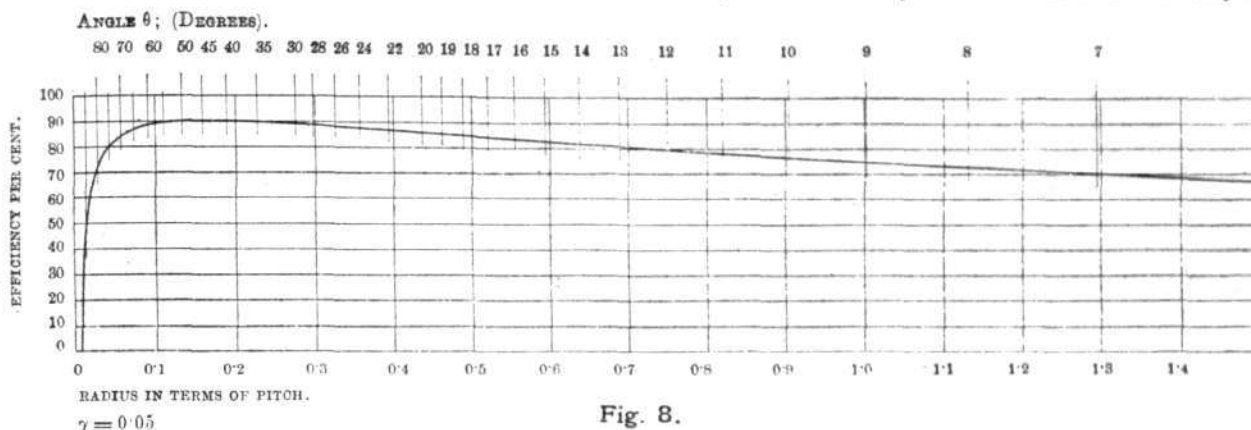
THE SCREW PROPELLER.

By F. W. LANCHESTER, M.Inst.C.E.

(Continued from page 323).

REFERRING once more to Fig. 15, it is clear that for any given value of θ the efficiency is greatest when the line ab is the shortest, and it requires no demonstration to show that this corresponds to the angle γ being the least possible; therefore the curve of maximum efficiency of Figs. 8 to 13 must be definitely founded on the mini-

mum value of γ ; by no jugglery can it be otherwise. Thus we have the remarkable fact that the conditions of best efficiency for the screw propeller can be laid down without giving a single thought to the question of the rotational component of the wake: as already stated, this is so in the special case of maximum efficiency only.



15. In all propeller design the question sooner or later arises as to how much of the efficiency curve to include in the blade length selected. If we take, say, the γ value 0.07, the graph for which is given in Fig. 10, it is quite clear that we have the option of utilising as much or as little of the curve as we please or may deem expedient. For example, if we select just the very best portion of the curve with a view to obtaining the highest possible efficiency, we shall have a propeller with a pitch diameter ratio round about 3 to 1, and the arms to carry the blades will require to be considerably longer than the blades themselves; clearly the losses in the resistance of the arms will be too serious, and the proportion of the disc area usefully employed will be so small that any such design is out of the question. This question has been discussed very fully in the author's previous work; it is a matter in which there must always be some latitude and discretion left to the designer; it is equally a matter in which some convention is necessary as representing normal practice.

For the purpose of the investigations forming Part III. of the present paper, the convention taken is that the diameter of the propeller is in every case twice that at which its efficiency is greatest; the meaning of this, as to the amount of the efficiency curve included, will be clear on reference to Figs. 8 to 13. A further

Now the value of γ may be its minimum value; that is to say, it may be the *least gliding angle*, but this is not essential; the equation applies equally whatever the angle happens to be; it applies equally in fact to the case of worm gear or the common screw press—the angle γ representing the effective angle of friction. In the case of the propeller, as in the case of the aerofoil, the condition of least gliding angle corresponds definitely to a certain P/V^2 value, expressed, as we know, in absolute units, thus $P = C \rho V^2$, the value of the constant C being (for least resistance) approximately equal to $\sqrt{\xi n}$ and commonly lying between 0.25 and 0.35 under ordinary conditions of design. Evidently when conditions permit we shall make use of the most advantageous P/V^2 value and design on the lines of the preceding section for optimum efficiency, choosing our effective blade length and corresponding pitch/diameter ratio appropriately; it is when there are requirements to be considered other than efficiency (and in some degree there are always other requirements), that we have to go more deeply into the problem and effect something in the direction of a compromise.

17. There are two particular limitations more commonly met with as imposed by engineering conditions (as apart from purely scientific considerations), both of which as it chanced tend in the same direction; these are a diameter limit and a pitch limit. The first of these

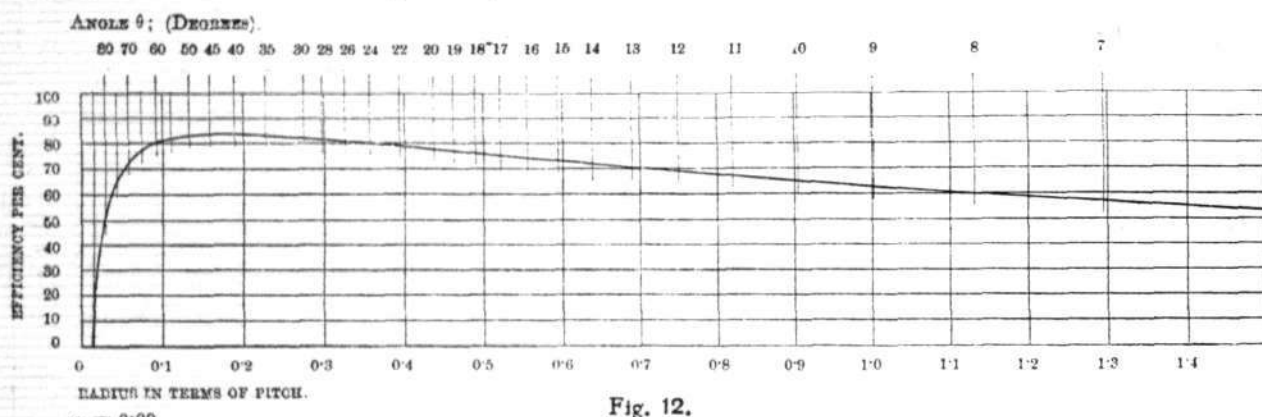


Fig. 12.

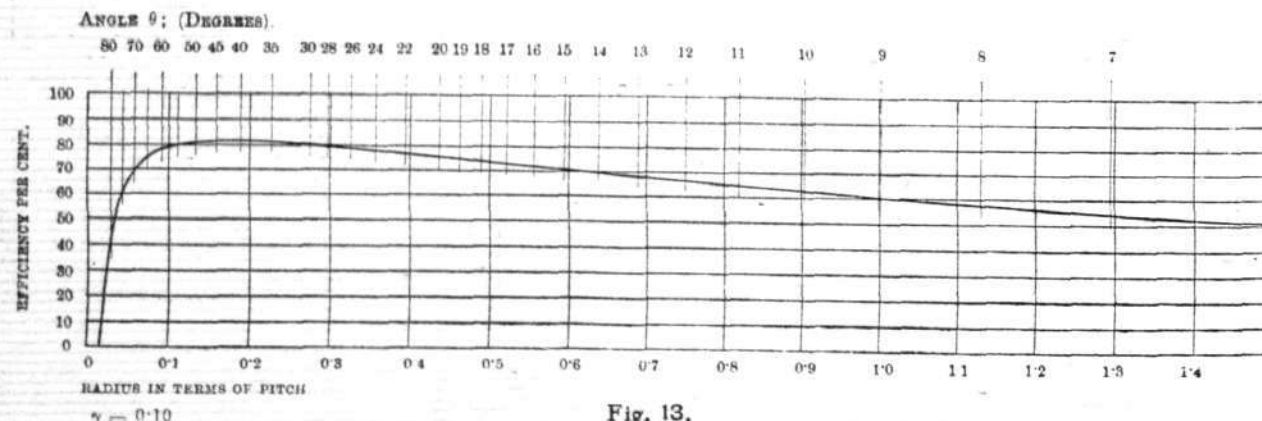


Fig. 13.

convention has been adopted to the effect that the active portion of the blade is *three-quarters of its total radial length*; thus, the central portion of the propeller, of one-quarter the diameter of the disc, is regarded as "blind," the blades within this circle are treated as spar sections, or alternatively the central region may be supposed occupied by a boss as actually the case in the Gifford propeller.

The convention as to the type of vortex motion in the blade periphery remains as before, the periphery being taken as represented dynamically by the content of a cylinder whose diameter is equal to the effective blade length. The justification for this will be found in the author's preceding contribution, "The Aerofoil in the Light of Theory and Experiment."

PART III.—The General Theory and Solution of the Screw Propeller.

16. We have seen that for any value of the gliding angle γ , the efficiency of propulsion is given by the expression $\frac{\tan \theta}{\tan (\theta + \gamma)}$ where θ is the effective pitch angle for any given element of the blade, and that the maximum efficiency is that corresponding to a value of $\theta = 90^\circ - \gamma$, the mean over the whole blade being less than this value by an amount depending upon the portion of the curve of efficiency utilised by the blade length selected.

is usually due to questions of ground clearance, or in the case of the marine propeller, limitations imposed by draught or proximity of hull, &c.; the second is due to the incompatibility between the engine or prime mover and the propeller as to revolution speed—more frequently than not the engine or motor constructor asks for a higher revolution speed (in order to save weight) than that required for the propeller of optimum efficiency. Under the conditions of restricted diameter, the thrust reaction has to be sustained by a lesser total area representing a lesser mass of air than that corresponding to highest efficiency, and if any attempt be made to design to the same constant C as before, the blade area will be found to represent a greater proportion of the total disc area than under the unrestricted conditions. If, as we may assume to be the case, the whole column of air or fluid be fully occupied by the periphery of the blades in the initial design, it is clear that the maintenance of the pressure constant at its theoretically best value will result in interference, and ultimately it becomes necessary to adopt a higher pressure constant and put up with a higher value of γ with a corresponding drop in the value of $\frac{\tan \theta}{\tan (\theta + \gamma)}$, that is to say, a loss of efficiency.

It may not be considered self-evident that the restriction as to pitch, i.e., the adoption of a pitch less than that of highest efficiency, tends of necessity in the same direction, but investigation

shows this to be the case; it is a fact otherwise well known to those who have practical experience of propeller design. As this point is made abundantly clear in the investigation which follows, it may be dismissed from immediate consideration. The question of the weight of the propeller also evidently tends to act in the same direction as the diameter limitation; apart from other limiting factors, it is evident that if, firstly, a propeller be designed for highest efficiency a reduction of diameter could be made without sensible loss of power, whilst a definite and measurable

gain would by this means be effected by the reduction in weight. At first glance it might be presumed that to meet the artificial restrictions such as those under discussion, all that is necessary is to calculate a higher value of γ to correspond with the new (higher) pressure constant, and to plot, or select from the plottings already given, the appropriate efficiency curve, and on this to base the design of a propeller as before; a little consideration, however, shows that the matter is by no means so simple.

(To be continued.)

✪ ✪ ✪ ✪ AIRCRAFT AND THE WAR.

A *Daily Mail* correspondent at Hazebrouck sent the following message on the 5th inst. :—

"Two Taubes were recently brought down near here by the British anti-aircraft guns. One of the airman, it is reported, was killed, another had both his legs broken, and a third, a lieutenant, was made prisoner. One of the machines was wrecked at Abele, a village between Poperinghe and the station of that name, and the other near Armentières."

The Salonica correspondent of the *Echo de Paris*, in a message on the 5th inst., said :—

"Two Turkish aeroplanes which left Sedd-el-Bahr flew over the Franco-British fleet and dropped a number of bombs, all of which fell into the sea.

"They subsequently made for the open sea to reconnoitre over the islands of Lemnos and Tenedos, but the Anglo-French ships opened fire on them, and they were speedily brought down. The German aviators were taken prisoners."

An Exchange correspondent at Athens, writing on the 5th inst., said :—

"It is reported from Tenedos that British ships yesterday continued to bombard the Turkish positions in the Straits. A fleet of hydroplanes co-operated in the work, and carried out reconnaissances.

"An English aeroplane flew over Panormos to-day, and destroyed a big bridge."

The following extract is from an article by Mr. E. Ashmead Bartlett, one of the special correspondents in the Dardanelles :—

"When your ship forms part of the squadron which is off duty, you lie at anchor off Tenedos, and have little to do except to watch the aeroplanes soaring upwards from the aerodrome—a fine natural piece of ground, which might have been specially designed by Nature for the arrival of Commander Samson and his gallant crowd of aviators, observers, and mechanics—and then disappearing towards the Straits, which are only eight miles away.

"Then one evening it is your turn for patrol, and you know that for the next forty-eight hours something exciting may happen. That night we are off the Straits, and watch the enemy's powerful searchlights, which still flash defiantly seawards. We cruise up and down, and at dawn are just off the entrance. We are on the bridge, examining the enemy's positions, when a sharp-eyed signalman calls out, 'Aeroplane coming overhead, sir.' We pick it up with our glasses, and see it is one of the latest which has just arrived from England; it is flying high, and passes over Gallipoli. Then another signalman calls out, 'They've fired at it, sir.'

"These remarks have been addressed to the captain. Just beneath the yellow wings, so it appears, but in reality much further off, a little ball of white smoke unrolls itself against the blue sky. It is shrapnel, and a little later the faint boom of a gun is wafted across the glass-like water to our ears. It is followed by another ball of white smoke, and yet another, but the shots are not very near. The aeroplane takes not the smallest notice, but continues on its way like some wild duck in full flight, undisturbed by the pellets of some sportsman who is almost out of range in the marsh beneath."

An *Evening News* correspondent, wiring from Rotterdam on the 6th inst., said :—

"The Allied warplanes are very active along the coast, and the German aerodrome at Ghistelles has been badly damaged by bombs."

The following information appeared in the *Temps* of the 7th inst. :—

"According to information received in Paris the German battery of 15 in. guns which bombarded Dunkirk last week was successfully located by a French aviator. He descended to within 150 metres of the concrete casemates near Dixmude, under which the guns were

hidden, and took photographs which enabled him to fix with absolute precision the position of the battery. With the help of this information over 200 shells were dropped on to the casemates, and it is believed that the battery was destroyed."

Writing from Bale on the 7th inst., a *Daily Telegraph* correspondent said :—

"No aeroplanes have been seen near the Swiss borderland for some days. My despatch of April 28th, concerning the unfortunate loss of a Franco-British aeroplane, which had dropped bombs over the railway station at Haltingen, is now confirmed. The biplane carried two aviators, one French and one British officer. It was returning to Belfort, after crossing the Rhine. The machine was fired upon from the batteries and fell. The pilot was apparently first wounded by shrapnel in the hand, as three of his fingers were shot away, and he had bandaged his hand during the flight, which was bravely continued. Finally another shot hit him in the head, probably killing him instantly, whereupon the aeroplane dashed to the ground in a vertical fall. The accompanying officer seemed to be un wounded by the shot, and was apparently killed only by the fall. The Germans are taking greater precautions than ever against aviators."

A correspondent of the *Morning Post*, in a description of the French Headquarters in the Champagne district, said :—

"In this district the French aviators seemed to have asserted their supremacy over their German rivals in no doubtful manner, and the German aeroplanes that venture over the French lines are comparatively scarce. The quarters of the men attached to this aeronautic station were particularly spick and span, and they have displayed much originality and cleverness in making them as neat and homelike as possible."

From Athens on Saturday a *Daily Telegraph* correspondent reported the following :—

"It is reported officially from Mitylene that an aeroplane flew over the Allied lines in the Dardanelles and caused some damage."

In the "wireless" news sent out from Berlin on Saturday it was stated :—

"Near both La Bassée and Vitry, east of Arras, a hostile aeroplane was forced to descend."

According to a telegram from Paris a Taube on Saturday morning flew over Montdidier and threw two bombs. One fell near the gasometer without doing any damage, and the second claimed one victim.

An Exchange message from Athens on Sunday, stated :—

"A German aeroplane flew over the Allied Fleet, and was fired at and brought down by the Queen Elizabeth."

A *Daily Telegraph* correspondent at Boulogne, writing on Monday regarding the new battle for Lille, said :—

"This new battle started on Saturday afternoon with a fierce artillery duel, but the German guns were soon located and put out of action by our airmen."

Mr. James Dunn, writing from Rotterdam to the *Daily Mail* on Tuesday, said :—

"A Zeppelin has passed north of Holland going in a westerly direction. An American woman who has just returned here from Berlin tells me that she was urgently warned by people in high quarters not to go to England during the next fortnight as a big raid is contemplated. She declares that the ruling passion in Berlin is to injure England at all costs. The more liners there are destroyed the better the Germans will be pleased. An airman told her that the Zeppelin flights hitherto made over England have been merely trial trips to test the British aerial defences."

In the "wireless" news sent out from Berlin on Tuesday it was stated:—

"An English flying machine was shot down south-west of Lille."

The *Times* Paris correspondent, writing on Tuesday, said:—

"This morning, about 7.15 a Taube flew over St. Denis, a Paris suburb, and dropped bombs at different points. Several people were wounded and a certain amount of damage was done to buildings. After a few minutes the Taube took to flight, pursued by French aeroplanes."

"A Zeppelin was reported passing over Compiègne at 8.15 to-night. Paris, however, was prepared to receive invaders, lights being extinguished, while in the star-strewn sky a number of aeroplanes, whose lights appeared as shooting stars, did a ceaseless patrol."

"There was not the slightest trace of panic, and at various points of vantage were crowds of sightseers who dispersed towards 10 o'clock, if anything, somewhat disappointed."

According to other information, the Zeppelin was seen crossing the French lines at Dammartin at 7.30. It turned north-west, and on being chased by French aeroplanes retraced its course towards Germany.

The *Daily Telegraph* Parisian correspondent, writing on Tuesday, said:—

"There was a small but very rapid air fight this morning, when a Taube was put to flight. I saw three French aeroplanes pursuing an Echelon. Puffs of smoke came from the German, and were answered. Pursuers and pursued then disappeared from sight."

"It now seems that the German aeroplane was not a Taube, but a captured French machine."

A *Daily Telegraph* correspondent, writing from Petrograd on Tuesday, said:—

"While their advance on Libau and Mitau was being carried out the Germans threw ten bombs into Grodno from a Zeppelin. These missiles varied in weight between 180 lbs. and 360 lbs., but do not seem to have done serious damage."

The *Daily Chronicle* correspondent in Paris, writing on May 11th, said:—

"A German aeroplane, carrying French colours, dropped incendiary bombs at 7.15 this morning over St. Denis (a suburb of Paris), wounding six soldiers, and causing some damage. The first bomb



The Air Raid on Southend.

CONSIDERING the large number of bombs rained on the Southend district by the raiding German airship in the early hours of Monday, it is extraordinary that comparatively so little damage was done. It appears that the airship was seen just before 3 a.m., and within about half an hour something like one hundred bombs, nearly all being of the incendiary type, were dropped on Southend, Leigh, Westcliff, and Prittlewell, the airship then disappearing in the direction of Canvey Island. A number of houses and shops were set on fire, and several people sustained injuries. Mrs. Whitwell, aged 58, succumbed to burns received through her house in North Road, Prittlewell, being set ablaze, and her husband was also seriously injured.

In the German "wireless" news sent out from Berlin there was the following item:—

"One of our airships bombarded the fortified town of Southend, at the mouth of the Thames, this morning with a few bombs."

Routes of Enemy Aircraft.

A FORTNIGHT ago we had occasion to draw attention to the possibilities in the spreading of information regarding places visited by enemy aircraft. In this strain a question was addressed to the Solicitor-General in the House of Commons on Tuesday. In replying Sir S. Buckmaster said that his attention had been called to the question raised. He had no official information as to whether the published reports had been of assistance to the enemy. It was obvious, however, that such accounts as had been published were liable to do much mischief, and steps had been taken to deal with the matter.

Alien Enemies and Aircraft Raids.

In his speech in the House of Commons on Tuesday, on the alien enemy question, Sir H. Dalziel said he had no doubt that some day Zeppelins would reach London, and he had no doubt that thousands of these Germans had already got their posts allotted to them, and that they would be willing to occupy them when the time came. It was known the Germans would stick at nothing, but would consider they would be doing a great service to the Fatherland if they

fell upon a house in the Rue de Paris, smashing the roof and the contents of two flats. In one of them two boys were breakfasting; one was slightly injured. Another bomb fell in the vast courtyard of the infantry barracks, where some men were occupied with horses and vans. It made a hole 3 ft. deep. A fragment of a bomb struck a lieutenant in the back. A Zouave who was an eye-witness of the incident told me that the aeroplane was at an altitude of about 1,800 ft. Five privates were also injured by fragments of the bomb. The lieutenant and wounded men were removed to hospital, where President Poincaré visited them this morning.

"After dropping the second bomb in the courtyard the Germans threw one on a two-storey house in the Rue de la Hermitage. It crashed through the roof, and fell in a room where a nine years old boy was sleeping. It set fire to his bed, but a neighbour rescued him in time. Subsequently the Germans dropped two bombs near the Vert Galant bridge. They fell in fields about 100 yards on either side of the railway, merely damaging some rows of green peas, and making large, deep holes in the fields."

Writing on Wednesday from the Pas de Calais to the *Daily Mail*, Mr. W. Beach Thomas said:—

"The Germans have launched a new fleet of aeroplanes or stimulated into a new activity their old ones. Some were yesterday over Dunkirk, and enough to constitute a fleet over different spots behind Ypres. A clear sky was cloudy with the smoke of shrapnel bursting round them."

In the Wednesday "wireless" news from Berlin there were the following items:—

"Hostile airmen yesterday bombarded Bruges without causing military damage."

"East of Dixmude we shot down an English aeroplane."

The *Daily Telegraph* correspondent in Paris, writing on Wednesday, said:—

"Four Germans aeroplanes were signalled about 7.30 this morning making for Paris. They were headed off by a squadron of French aeroplanes and compelled to turn tail."

A *Morning Post* correspondent in Amsterdam, writing on May 12th regarding the fighting round Ypres, said:—

"The British guns and maxims were cleverly concealed, so that hostile airmen were not able to locate them."

"On May 8th, an aeroplane appeared over Treves. A heavy fire was directed against it. It was afterwards ascertained that the aeroplane was a Taube, with two German officers. The aeroplane was hit by a bullet."



were to deal a death blow at the heart of the British Empire. Lord Charles Beresford also said that unless something was done before Zeppelins came, he was firmly convinced that if they dropped fire on London all the 20,000 Germans in the Metropolis, who were German at heart, would light up the city in twenty or thirty different places. He did not want reprisals, but he wanted to see these people locked up—not waiters and barbers and that class of people; he wanted to get hold of people in high social position.

Canada and Military Aviation.

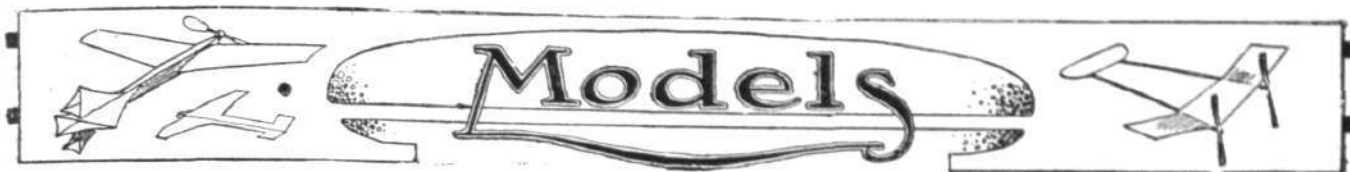
ACCORDING to reports from Canada, the military authorities there are endeavouring to arrange for five new training grounds for aeroplane pilots; one for the second military district at Toronto, another for the first military district, London, Ontario; a third for Northern Alberta, a fourth in Northern Saskatchewan, and the fifth in British Columbia. There has been a rush of recruits for the Royal Naval Air Service, who are to be trained by Mr. J. A. D. MacCurdy at Lawrence Park, Toronto.

Wilbur Wright Memorial Lecture.

DEFINITE arrangements have now been made by the Aeronautical Society for the third Wilbur Wright Memorial Lecture to be delivered at the Royal Society of Arts, John Street, Adelphi, on Thursday next, 20th inst., at 8.30 p.m. It will be remembered that this year Prof. G. H. Bryan, F.R.S., will be the lecturer, and his subject will be the "Rigid Dynamics of Circling Flight (Steady Motion in a Circle—Lateral Steering of Aeroplanes)." Mr. F. W. Lanchester will take the chair.

Military Aviation in China.

ACCORDING to the *Japan Weekly Mail*, the Aviation School at Nanyuan, founded by the Chinese Government, held its first graduation ceremony early in March, on which occasion thirty-three students were granted diplomas. It is said that these young aviators have shown great intelligence and zeal in their work, and that all have attained considerable skill in the management of both biplanes and monoplanes. Two of the aeroplanes used at the school were made by Chinese engineers.



Edited by V. E. JOHNSON, M.A.

Some Hints on the Building of Model Aeroplanes.

Materials.

WITH respect to the best materials to use the conclusion to which the writer has come is that the three best materials are *bamboo, steel, silk*. The mistake which is generally made when employing bamboo is that the "cane" or "stick" from which the part used is obtained is of far too small a diameter. Penny canes are useless; a short length of a much larger rod should be got, say 4 ft. of a cane 2 or even 3 or 4 ins. in diameter, then carefully sawn up into strips. Next remove by planing or cutting all ridges, &c., and by the same method remove all the white pithy inner wood, then sandpaper (if necessary) the hard glazed outer surface, and you have left a strip of tough wood of great strength and resilience, an ideal substance for model construction. Bamboo may be bent into any required shape by either the "dry" heat from a spirit lamp or stove, or it may be steamed—the latter method is preferable, as there is no danger in this case of "scorching" the fibres on the inside of the bend.

When bent it should be fastened on to a former having a somewhat greater curvature than the one actually required, because when cool and dry it will be sure to go back slightly. It is best left on the former till quite dry. For skids, struts, spars, and ribs its use is to be highly recommended, but we do not now recommend the use of an entire tube piece for the motor rod, or, indeed, for any other purpose. The use of the tube "entire" is to be deprecated. It contains too much useless matter, and, therefore, unnecessary and undesirable weight. An objection sometimes urged against the use of bamboo is that it is inclined to split—especially at joints or at the ends, and that a difficulty is experienced in making really successful joints. The ribs can be attached to the spars by lashing them to thin T strips of light metal (very thin steel), using thin thread or silk, and not wire, for lashing purposes, as the latter "gives" too much, and also cuts into the fibres of the wood. The very best joints are made, however, by carefully partially splitting and mortising the respective pieces, glueing well (using a good thin glue or some substance such as mendine as an adhesive) and carefully and thoroughly binding with thin silk tape or thread. Personally we prefer thread (ordinary carpet thread), but some prefer narrow silk tape.

Bamboo in tube form, thickness one-third diameter, has a transverse rupture of 22,500 lb. per sq. in. and a weight of 55 lbs. per cub. ft., but, as has already been stated, at least one-third of this weight is useless and best removed, and as a motor rod it is preferable to use a built up hollow section—made, say of rolled veneer wood, carefully glued and then well varnished. If additional strength be desired the same can be covered with silk and then varnished.

It must, however, always be carefully borne in mind, that whilst hollow sectioned work is in certain cases strongly to be recommended—owing to its great strength combined with lightness—it must always possess a greater cross section, and therefore (more especially when used transversely) it considerably increases the head resistance of the model.

Although we do not recommend the use of bamboo in tube form for the motor rod as the best form for such, there are many worse, and a piece one yard in length $\frac{3}{8}$ -in. in diameter, and of weight $\frac{1}{2}$ oz. per ft. will be found to carry a rubber motor of even 30 to 50 strands quite successfully if provided with suitable kingposts.

Steel.—It is probably not too much to say that, practically speaking, every model aeroplane uses steel in some form or another in some of its parts.

All steel models (planes silk surfaced) have been built and flown quite successfully—and its use is one which is certain to increase more and more as suitable material, in the form of very thin tubing, &c., is placed upon the market.

Steel is some nine times as heavy as bamboo, and has a rupture stress about four and a half times as great; but, as already stated, lightness and strength are not the only things that have to be provided for in model aeroplane building—there is the question of head resistance, as small a cross-section should be offered to the air as possible; moreover that section should be of streamline form.

Now, while ash and bamboo and certain other woods can carry a higher load per unit of weight than steel, they must always present about three to three and a half times the cross-section, thus producing a somewhat serious obstacle, whilst otherwise meeting certain requirements that are most desirable.

Steel must always, of course, be considerably more expensive than wood, steel tubing such as we are here considering costing probably some eighteen to twenty shillings a lb., but in the form of steel wire, umbrella ribs, &c., it is quite cheap.

The tensile strength of steel wire is about 300,000 lbs. per sq. in. For aerofoil framework of small models, for all purposes of staying or where a very strong and light tension is required this substance is invaluable: for skids, protectors and shock absorbers, also for hooks to hold the rubber motor strands, &c., &c.

Silk.—This is the strongest of all organic substances for certain parts of aeroplane construction. It has, in its best forms, a specific gravity of 1.3, and is three times as strong as linen and twice as strong in the thread as hemp. Its suspended fibre will carry 150,000 ft. of its own material, and sustain 35,000 lbs. per sq. in. of its cross section, this being about six times the same figure as for aluminium and equal to about 75,000 lbs. of steel tenacity, and 50 more than is obtained with steel in the form of watch springs or wire. For aerofoil surfaces the only other substance which surpasses it is goldbeater's skin, an extremely difficult subject to deal with successfully. Silk weighs about 62 lbs. per cub. ft., steel about 490 lb.; thus paying due regard to this fact, and to its very high tensile strength, silk is superior to even steel wire stays.

A Japanese silk gut is an admirable substance for such, being very strong, and extremely light; it can be obtained at shops where fishing tackle is sold.

Combining the Materials.

Having selected our materials, there remains the question of combining them so as to give the best results. When constructing a model aeroplane, it is very important not to interrupt the continuity of any rib, tube, spar, &c., by drilling holes or making too thinned-down holding places; if such be done additional strength by binding with thread or silk tape is essential, or by slipping a piece of slightly larger tube over the other; the fit must be a tight one; pack if necessary with copper foil or some such substance until it is.

The drilling of holes, the use of screws, gimp pins, &c., should be avoided as much as possible; steel screws rust in time, and often result in a breakage. We have never tried it, but it might be a good plan to grease them first. The soldering of metal round wood should also be abstained from, as the wood rots in time unless such be very carefully done.

In every case the combining of "steel" and "wood" needs to be done with great skill and forethought, or else the former is bound to act in time to the detriment of the latter.

The enclosing of certain parts of the wood (where joints are) in metal fittings is not good as the wood often snaps at such joints especially in the case of skids. For strength and endurance nothing equals well-glued and bound all-wood joints.

If steel be used throughout, then *very thin* copper binding and careful and clean soldering should be employed.

Flexible Joints.

In a biplane such are often a decided advantage. They can be made by fixing wire hooks and eyes to the ends of the "struts" and holding them in position by using an adhesive and binding with silk or thread. Rigidity is obtained by the use of steel wire or thin silk cord.

Double Surfaces.

Owing to the extra weight and difficulties of construction on a small scale it is not advisable to use "double surface" aerofoils on small models—say under 5 or 6 ft. span.

Motor Torque.

In the case of single propeller models, it is a good plan not to have the motor rod connected with the outrigger carrying the elevator, because the torque tends to twist the carrying framework and interferes with the proper and correct action of the elevator. If so carried, kingposts and suitable stays must be used to overcome both the pull and the torque. In all cases the framework must possess sufficient rigidity to prevent distortion in such a case. This is one of the chief reasons of many failures.

The International Correspondence Club of Aeronautics.

More members are urgently wanted for the above club, which has just been organised.

Its object is to further the interest in aeronautics amongst boys and young men by means of correspondence.

There are far too many boys and young men to-day following up interesting but useless hobbies, and one of the main objects of this club is to "capture" these and bring them to a more serious way of thinking, namely—*aeronautics*. We invite all readers of these words to join us in this enterprise, members of other clubs especially. Those who are "well up" in the subject are specially invited.

There are no subscriptions or obligations whatever, and all letters to the secretary are answered immediately. Applications for membership and copy of rules, &c., should be made to the Hon. Sec., H. Lister Bradley, 4, Trilby Street, Wakefield (Yorks). We are also endeavouring to form branches abroad.

CORRESPONDENCE.

Stream-lining and Resistance.

[1899] It occurred to me recently that it might be of interest to determine how far the reduction of resistance by stream-lining inter-plane and similarly exposed struts was conducive to increased total efficiency.

Now in a strut we may consider two forms of efficiency, namely: aerodynamic efficiency and mechanical efficiency. I propose with your permission to endeavour to show that there is a limit to the degree in which the efficiency of either one of these factors should be carried.

The data which have been used in the following calculations are obtained from Mr. Ogilvie's valuable account of his experiments published in *FLIGHT* for June 15th, 1912, Vol. IV.

The method of investigation is as follows:—

1. The h.p. required to propel the strut through the air will be calculated.

2. The h.p. required to carry the strut is determined.

The results of the above are then added. This gives the total power consumed by this strut.

The h.p. is determined by multiplying the weight in pounds by velocity in feet per second and dividing by 550.

In the resistance calculation *W* is displaced by *R*.

In the accompanying table the number used is the same as that in the original article.

All the figures are for 100 ft. run of spruce.

No.	h.p.R	h.p.W	h.p.R + h.p.W	$\frac{1}{R}$	$\frac{1}{B}$	$\frac{1}{h.p.R + h.p.W}$
51	35	37	405	219	4	335.3
31	38	24	278	130	2½	342.8
43	38	26	298	137.1	3	345
6	56	27	326	64.2	2	208.9
22	12	136	276	26.1	2	207.2

Strut No. 51 was the most efficient, aerodynamically, of the whole series, but as a useful member it shows up very badly.

31 and 43 are chosen because they offer the same resistance.

22 is the old style Farman strut.

The last shows relative values of strength to total horse-power.

It is clear from the above that the strut which offers the least resistance is not by any means the most suitable strut to apply to a machine.

Bedford Park.

S. C. SHEPLEY-PART.

The late 2nd Lieutenant Rhodes-Moorhouse.

[1900] I notice the reference to words of Nelson's historic signal in the notice which you gave in last week's issue of *FLIGHT*, but it is news to me that these words were ever signalled by Britain's great admiral. Could you give me some indication of the source of your information? "R.N."

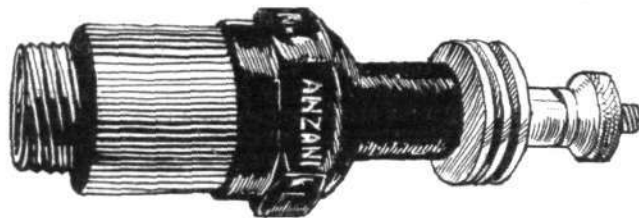
[The unfortunate dropping out from the paragraph of three words (shown in italics below) explains the seeming absurdity. It should have read: "and that, in the spirit of the words of Nelson's" &c. From the context it was quite obvious what was meant.—E.D.]

Death of Master Guy Lewin.

It is with regret we hear of the death of Master Guy S. Lewin, familiarly known to many Hendon *habitues* during the last four years as "Winkle." Although not quite 13 years of age, he had made as many as 48 flights with the various pilots at the aerodrome from its earliest days until quite recently. His father, Mr. F. Guy Lewin, who is so well-known in the motor world, was in the passenger list of the "Lusitania," and it is not yet officially stated whether he is amongst the survivors.

"ANZANI" SPARKING PLUGS.

In the majority of cases where engine trouble can be traced to the ignition plugs, the fault generally consists in the latter, for one reason or another, being unsuitable for the engine. It is a well-known fact, particularly with regard to aero engines, that a plug which will perform its functions faultlessly when used on one type of engine will give but indifferent results on another type; for instance, plugs that are used with success on rotary engines will constantly give trouble when used on a stationary air-cooled engine. Clogging up with oil, and the sooting of the electrodes is about the most common trouble, and it is this problem that the designers of



the "Anzani" plug, seen in the accompanying sketch, have had in mind in producing this plug. As its name implies, it is specially recommended by the General Aeronautical Co., Ltd., of 30, Regent Street, London, S.W., who are placing it on the market for use on all types of Anzani engines. They were used on the engine run at the military engine trials, and gave no trouble throughout the test. Designed to stand hard service, the body of the plug is of blued steel, whilst the insulation is mica, the latter extending to about midway down the body of the plug, leaving a space round the lower portion of the central electrode, which is of steel, with an outer shell of copper. The head of the plug has copper radiating fins to assist in cooling. These plugs sell at 10s. 6d. each.

PUBLICATIONS RECEIVED.

On the Motion of a Sphere in a Viscous Fluid. By W. Ellis Williams, B.Sc. W. Ellis Williams, University College, Bangor.

The German Danger. By Maxime Hebert. Leitchworth: The Garden City Press, Ltd. Price 1s.

IMPORTS AND EXPORTS, 1914-1915.

AEROPLANES, airships, balloons, and parts thereof (not shown separately before 1910). For 1910 and 1911 figures, see *FLIGHT* for January 25th, 1912; for 1912 and 1913, see *FLIGHT* for January 17th, 1914; and for 1914, see *FLIGHT* for January 15th, 1915:—

	Imports.		Exports.		Re-Exportation.	
	1914.	1915.	1914.	1915.	1914.	1915.
January ...	5,945	20,382	210	435	879	13,706
February ...	28,132	380	106	138	441	18,823
March ...	27,731	280	1,934	7,218	1,440	5,090
April ...	11,384	2,189	1,175	23,986	1,473	275
	73,192	23,231	3,425	31,777	4,233	37,894

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